Industry Power

A Putman Publication | "Executive Magazines for Industry"

MARCH 1957

For Men Who Manage

Power Services

Industry Power Exclusive

FLUID COKE

SEE PAGE 12

American Power Conference

NEW ERA FOR POWER ENGINEERS

R. A. BUDENHOLZER,
DIRECTOR
AMERICAN POWER CONFERENCE

$1.00 the copy

Unretouched photo of dissolved oxygen attack in steam condensate return lines.

DEPOSIT OF NO RETURN

The "growths" you see on the interior of this condensate return line are known as tubercles. Beneath each tubercle is a cavity or pit in the metal surface—the result of concentrated, localized attack by the corrosive water. Water containing dissolved oxygen has converted metal on the pipe's interior to iron oxide, causing a buildup of corroded material. The velocity of the water flowing through the line is not sufficient to remove the tubercles, so they continue to grow larger and larger.

Dearborn's FILMEEN* prevents this corrosive attack by forming a continuous, monomolecular film on the interior surface of the pipe, protecting it against both oxygen and carbon dioxide corrosion. FILMEEN provides a protective, non-wettable barrier between treated steam, or condensate, and metal pipe surfaces.

FILMEEN is only one of many Dearborn water conditioning products scientifically developed to control specific corrosion problems. Others eliminate scale, sludge, carry-over, and similar difficulties.

Power engineers in leading industrial and commercial plants place their confidence in Dearborn's 70 years of experience in water chemistry. They have found the answer to the demand for complete plant protection in Dearborn Supervisory Service—a properly balanced water conditioning program which combines quality products with correct, technically supervised control methods and test procedures.

Let a Dearborn Engineer survey your plant and recommend the type of water control program best suited to your requirements.

Illustrated Booklet gives all the facts on Dearborn Water Conditioning Program. The coupon is for your convenience.

**FILMEEN is the trade-mark of a corrosion-inhibiting compound patented and produced exclusively by Dearborn Chemical Company. U. S. Pat. No. RE 23614.*

Dearborn®

...a leader in water conditioning and corrosion control since 1887

Dearborn Chemical Company
Merchandise Mart Plaza, Dept. INP, Chicago 54, Ill.
Gentlemen:
☐ Send my copy of Dearborn Water Conditioning Program.
☐ Have a Dearborn Water Treatment Engineer call.

Name.....

Company.....

Address.....

City.....*Zone*.....*State*.....

Circle 143 on READ-N-CIRCLE card for more data

that's interesting

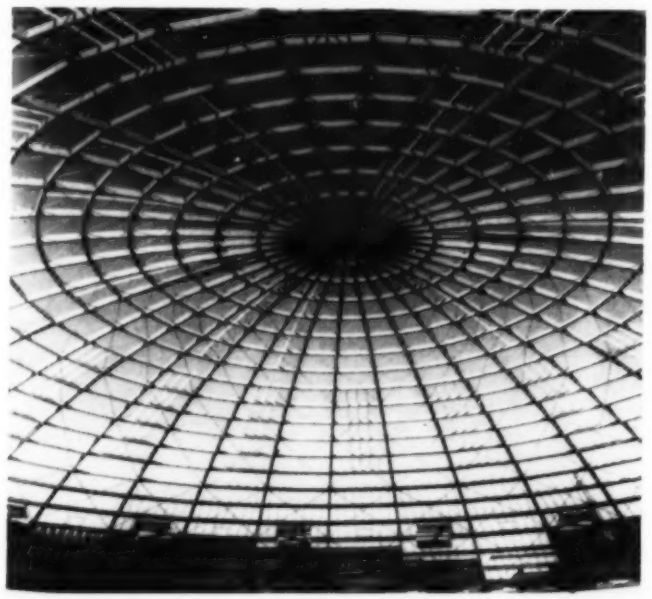
. . . for industry power

Heating element sprays on

A new patented product manufactured by Verrall Moe Electronics Inc. can be sprayed, rolled, or printed on the surface of any shape or contour to provide radiant heat without using resistance coils.

Timber dome spans 300 feet

A recordbreaking 300-foot dia timber dome has just been completed for the main arena of Montana State College's new physical education center at Bozeman, Mont. Dome structure is a webbing of glued laminated arches and purlins that rises 90 feet high at



the center. It rests on columns standing outside the arena's perimeter wall. Dome system requires 150,000 bd-ft of lumber—enough for 15 average-size homes. Arches are made in segments 51 feet long. Erection took only 10 weeks. Cost of the laminated dome in place is $2.20/sq ft.

Computer designs power piping systems

Until now, a month or more might be needed by skilled stress analysts to complete complex design computations for safe distribution of thermal stresses in large piping systems. Now, Blaw-Knox Company's Power Piping Division has a new computation method that uses electronic computers. Computations can be completed within a single working day. Method is available for use by consulting engineers and by companies and individuals responsible for power piping system design.

Data fed into machine consist only of dimensions taken easily from an isometric drawing of the piping system, and a few physical properties of the pipe material. All results are carried to six significant figures. Machine informs operator of any errors in input data and, if permitted, will substitute correct dimension automatically. ♦♦

Industry Power

FORUM

New Era for Power Engineers

R. A. BUDENHOLZER, Director
American Power Conference
with H. A. Bergen, Editor

About R. A. Budenholzer

R. A. BUDENHOLZER has been director of the American Power Conference since 1952. Active in the predecessor organization, Midwest Power Conference, he served as its director from 1949 until 1951. Largely through his leadership the APC has become the nation's leading independent power forum.

Dr. Budenholzer was born in St. Charles, Missouri, on November 24, 1912. He has served on the staff of California Institute of Technology. In 1940 he became an instructor of mechanical engineering at Illinois Institute of Technology, Chicago, and rose to full professor in 1947.

His work at Illinois Tech has been primarily associated with heat power engineering, thermodynamics, and heat transfer. He has devoted a great deal of effort toward developing graduate courses in steam power plants and power plant economics. As director of the American Power Conference, he has been a careful observer of progress in the power industry for a number of years.

In addition to his professorship, Dr. Budenholzer has been active as a consultant to Armour Research Foundation, where he has guided research projects in application of digital computers to solving turbine and power plant heat balance calculations.

He is a member of five professional societies and of Tau Beta Pi, Pi Tau Sigma, and Sigma Xi. Dr. Budenholzer is an advisory member of Power Division, ASME.

GROWTH OF THE power industry has far exceeded expectations of even the most optimistic during the past two decades. Although this growth represents spectacular achievement and has received a great deal of publicity, it represents only one aspect of current progress in the industry. A less publicized but far more important factor is the entry of the industry into a new, more mature era of engineering.

Not so many years ago, the average power engineer was content to let manufacturers and consulting engineers do much of his thinking for him. He was only incidentally concerned with details of equipment design or with intricate heat balance calculations and load studies. Even though he gave some thought to economic selection of equipment, he did not understand the science of power plant economics too well. The complex calculations now considered essential for economic selection of equipment he sometimes imperfectly applied, or did not apply at all. The average power engineer was basically an operator.

In contrast to this, the power engineer of today is usually a college-trained, professional-level engineer. In utility and industrial plants alike, he finds that rule-of-thumb engineering is rapidly becoming a thing of the past, being supplanted by highly scientific methods and procedures that require continuous study and exchange of information. His dependence on manufacturers and consultants to spoon-feed engineering services is also disappearing.

Demand now is for more astute engineers who have their own ideas for plant improvement and economy of operation. By working with the manufacturer and consultant, a formidable *team* is created, capable of solving the most difficult engineering problems in a professional engineering manner.

Thousands of young college graduates are being employed to develop new ideas and methods. These young men are pushing manufacturers beyond the limits of their own initiative to develop better power services equipment. They are forcing improvements in efficiency, compactness, and reliability of power generation facilities that would have staggered the imagination but a few years ago. A prime example is the development of new gigantic steam generators of sufficient size and reliability to require only one operator per turbogenerator. A similar tendency appears to be asserting itself with respect to turbine-driven boiler feedpumps. Trends lean toward ever-higher pressures and temperatures, and larger and larger sizes.

Just why has all of this come about? Is it simply by accident, or because demand for electric energy has become so great? Neither of these reasons is an adequate explanation. While increase in demand could account for increased capacity, it could hardly account for the giant strides in improvement of equipment so evident in our modern power stations. One important factor undoubtedly has been the intense spirit of friendly rivalry that has always permeated the industry and causes one company to try to outdo the other. Another is the sheer economic incentive of trying to achieve maximum power output per dollar expended. Still other factors are the natural desire to build better plants and equipment and to constantly seek improvement with the addition of every new facility.

Yet, two often-overlooked factors stand out in my mind as playing the major roles. The first is the influx of young, imaginative, highly trained engineers into the power industry. Their knowledge of modern mathematics, fluid mechanics, thermodynamics, heat transfer, combustion, electronics, power systems, and other fields enables them to solve seemingly insurmountable problems (often with

(continues on page 41)

307 NORTH MICHIGAN AVENUE, CHICAGO 1, ILLINOIS • DETROIT • NEW YORK • ST. LOUIS • MINNEAPOLIS

OMAHA • LOUISVILLE • WASHINGTON, D.C. • TERRE HAUTE, IND. • MOUNT HOPE, W. VA.

Circle 148 on READ-N-CIRCLE card for more data

Industry Power

A PUTMAN PUBLICATION

Shepard-Benning Building, Saint Joseph, Michigan

Telephone: YUkon 3-5515

VOLUME 72 NO. 3 MARCH 1957

Serving more than 47,000 circulation in manufacturing, service, and utility industries:

- Food and kindred products
- Textiles
- Lumber and wood products
- Chemical and process
- Stone, clay, and glass
- Electric machinery, equipment, and supplies
- Machinery and fabricated products
- Primary metals
- Transportation equipment
- Other manufacturing, including ordnance
- Mines, quarries, and ore-handling plants
- Utilities: electric, gas, water, and pipelines
- Public service and institutions
- Engineering services

A Publication of

PUTMAN PUBLISHING COMPANY

also publishers of CHEMICAL PROCESSING, FOOD PROCESSING, and FOOD BUSINESS

111 E. Delaware Place, Chicago 11, Ill.

Russell L. Putman	President
John Paul Taylor	Vice President
Ewing W. Graham	Vice President and Treasurer
George W. N. Riddle	Director of Research and Development

ADVERTISING REPRESENTATIVES

CHICAGO
Tom Bauron
111 E. Delaware Place,
WHitehall 4-6141

CLEVELAND
Fred S. Brandt
10006 Carnegie Avenue,
SWeetbriar 1-8138

HOUSTON, DALLAS, TULSA
Donald F. Maguire
515 Newport Avenue,
Webster Groves, Mo.
WOodland 2-4384

LOS ANGELES
Bob Wettstein
Walter P. Greenwood
672 S. Lafayette Park Place,
DUnkirk 8-2286

NEW YORK
Charles S. Roever
Ransom P. Reynolds
369 Lexington Avenue
MUrray Hill 6-7738

PHILADELPHIA
William E. Carr
600 Commercial Trust Bldg.,
16 S. Broad Street,
RIttenhouse 6-0565

PORTLAND
Bob Wettstein
337 Pittock Block,
921 SW Washington Street,
CApitol 8-4107

SAN FRANCISCO
Bob Wettstein
Jerry Nowell
Howard Building,
209 Post Street,
YUkon 6-2522

SOUTHEASTERN STATES
Richard H. Putman
111 E. Delaware Place
Chicago 11, Ill.
WHitehall 4-6141

INDUSTRY POWER including INDUSTRIAL POWER is published monthly by Putman Publishing Company, Shepard-Benning Building, Saint Joseph, Michigan. Member of Business Publications Audit of Circulation, Inc, and National Business Publications, Inc. Accepted as Controlled Circulation Publication at Saint Joseph, Michigan.

Copyright 1957, Putman Publishing Company.
Subscription information: Mailed without charge to executives and engineers in selected plants and organizations who are responsible for the selection, installation, operation, and maintenance of equipment required for Power Services. To all others there is a subscription price of $10.00 per year in U.S. Outside U.S. subscription price $15.00. Single copy $1.00. Send Form 3579 to Saint Joseph, Michigan.

A PUTMAN PUBLICATION

Industry Power

FOR MEN WHO MANAGE POWER SERVICES

VOLUME 72 NO. 3 MARCH 1957

In this issue . . .

firing fluid petroleum coke 12
This new fuel is just now being test fired at Delaware City Power Station, which has been engineered and designed specifically for it. INDUSTRY POWER's editors bring you an exclusive story, gathered on the spot, about the ramifications of firing fluid coke.

best in control room lighting 14
Los Angeles Dept. of Water and Power made extensive studies that showed luminous ceilings are best for power plant control room lighting. Here are the significant design details they worked out, with comparative cost data, and their advantages over other types of lighting.

nine guideposts to purchased power reliability 16
Talents of electric power services engineer must be combined with those of fire protection engineers to protect your plant effectively. These guideposts will help you check how reliable your power supply is, and show where it can be improved.

check your scales 18
No matter what you weigh, scale errors cost money. In power plant operations this is particularly true. This article may help you to decide on which scales will serve you best and what you can do to keep them doing just that, in spite of rugged service conditions.

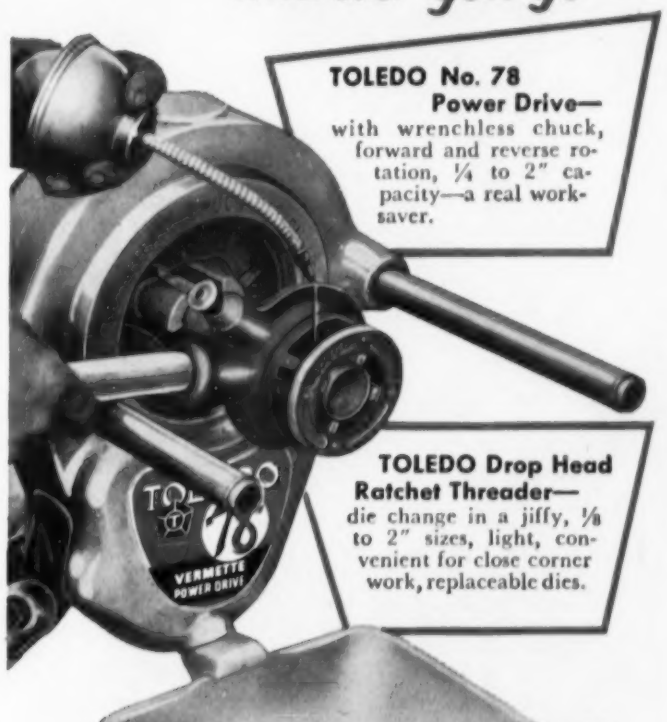
power basics for today's industry 20
engineering economics
Part II — the money tree. Discusses how money grows, the time value of money, compound interest, depreciation, and the concept of a sinking fund with examples and simple algebra.

monthly features . . .

that's interesting	2	basic bulletins	32
forum	3	names make news	46
nuclear news	6	handy guide	49
late news	8	available reprints	52
this month's comment	11	advertisers' index	53
new bulletins	24	the locator	53
new products	26	coming events	55

PORTABLE POWER THREADING

Ready to go-- wherever you go


TOLEDO No. 78 Power Drive— with wrenchless chuck, forward and reverse rotation, ¼ to 2" capacity—a real work-saver.
TOLEDO Drop Head Ratchet Threader— die change in a jiffy, ⅛ to 2" sizes, light, convenient for close corner work, replaceable dies.
78
VERMETTE POWER DRIVE

Take the toil out of threading . . . this chuck locks pipe or conduit in place—with one finger-tightening. Just put the pipe in the wrenchless chuck, "finger" tighten, turn the switch and you're ready to go. Team the No. 78 with a TOLEDO Drop Head Threader and your threading jobs are turned out in seconds. See these TOLEDO-quality products at your supplier's today!

Send for complete information.

THREADED PIPE it's tight—it's best—costs less

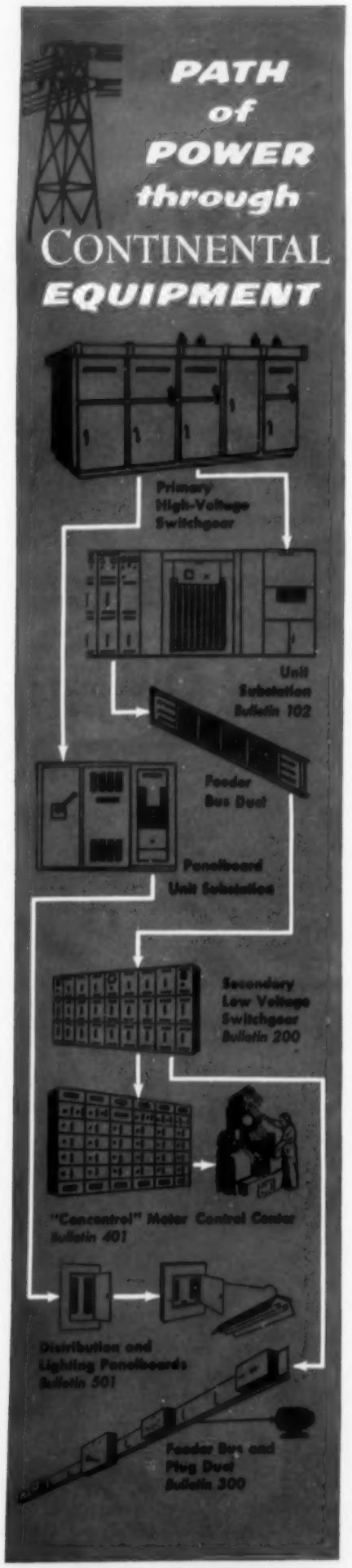
BUILDERS OF THE WORLD'S FINEST PIPE TOOLS

TOLEDO®

PIPE THREADERS • PIPE WRENCHES • PIPE MACHINES

THE TOLEDO PIPE THREADING MACHINE CO. • TOLEDO 4, OHIO

Circle 106 on READ-N-CIRCLE card for more data


PATH of POWER through
CONTINENTAL EQUIPMENT
Primary High-Voltage Switchgear
Unit Substation Bulletin 102
Feeder Bus Duct
Panelboard Unit Substation
Secondary Low Voltage Switchgear Bulletin 200
"Concentrol" Motor Control Center Bulletin 401
Distribution and Lighting Panelboards Bulletin 501
Feeder Bus and Plug Duct Bulletin 300

CONCENTRATE MOTOR CONTROLS IN ONE COMPACT "PACKAGE"

"Concentrol"

MOTOR CONTROL CENTERS

"Concentrol", achievement of CONTINENTAL design, engineering and craftsmanship, assures you of maximum personnel safety and production continuity in a motor control center. Self-supporting, pre-wired and standardized, it cuts installation time and costs, saves hours of engineering.

- ***MODULAR CONSTRUCTION*** — structures can be added or moved quickly, easily.
- ***SPACE SAVING*** — back-to-back arrangement requires half the floor space.
- ***EASY ACCESSIBILITY*** to all units, for reduced maintenance.
- ***ALUMINUM*** construction available.
- ***USES STANDARD STARTERS*** of your own choice.

Compare for yourself.
Write for Bulletin 401 today.

SHIPMENT: 4 Weeks*

NEW "Concentrol" PLUG-IN UNITS

. . . for greater safety, easier insertion and removal. All wiring is accessible from front. Removable door hinges facilitate installation and maintenance.

CONTINENTAL ELECTRIC EQUIPMENT CO.

General Offices: 207 West 4th Street, Cincinnati 2, Ohio

Manufacturing Plants in Ludlow, Ky. and Tampa, Fla. Sales Engineering Offices in all Principal Cities

*Standard arrangements with size 1, 2 and 3 full voltage, non-reversing starters. For other arrangements or starter requirements, refer to Factory.

Circle 120 on READ-N-CIRCLE card for more data

nuclear news

. . . about industry power

FIRST EXPERIMENTAL POWER REACTOR GOES INTO OPERATION

First nuclear power system in the United States designed and built solely for experimentation in power generation went into operation at Argonne National Laboratory last month. The Experimental Boiling Water Reactor (EBWR) first went critical last December 1. It is rated 20,000 kw (heat) and 5000 kw (electric). Unique feature of the EBWR is that live steam generated in the uranium core is piped directly to a turbine, eliminating intermediate heat exchangers.

RUSSIA MAKING PROGRESS TOO

Very rapid progress in nuclear power is being made in Russia, according to information released by Harris, Upham & Co., an investment brokerage firm. Russia was the first to build and operate a small nuclear power plant . . . . a 5000-kw pressurized water unit which became operational in June 1954. This project, reports Harris, Upham, has been followed by a five-year program to provide 2½ million kw in nuclear power. The Soviets intend building 10 different types of power reactors by 1960 plus a nuclear propulsion system for an icebreaker. But, the brokers report that the U.S. has 214 reactors either built, under construction, or definitely planned . . . . and that we are investigating by far the greatest variety of reactor systems.

LIST OBSTACLES TO NUCLEAR DEVELOPMENT

According to Atomic Industrial Forum, lack of economic incentive is viewed by American industry as the most important obstacle to development of atomic energy for peaceful purposes. Insurance and indemnification, secrecy and classification, lack of trained manpower, and government administrative policies and practices showed up as almost-equal contenders for second-place obstacle in a poll completed by AIF of some 167 respondents.

JOINT COMMITTEE ELECTS DURHAM, SETS HEARINGS

Representative Carl Durham of North Carolina has been elected chairman of the Joint Congressional Committee on Atomic Energy.

Rep. Durham had been vice chairman of the committee during 84th Congress . . . . Joint Committee began holding hearings a few weeks ago to provide an opportunity for industry and other interested persons to present their views on the peacetime atomic energy program and the law governing that program.

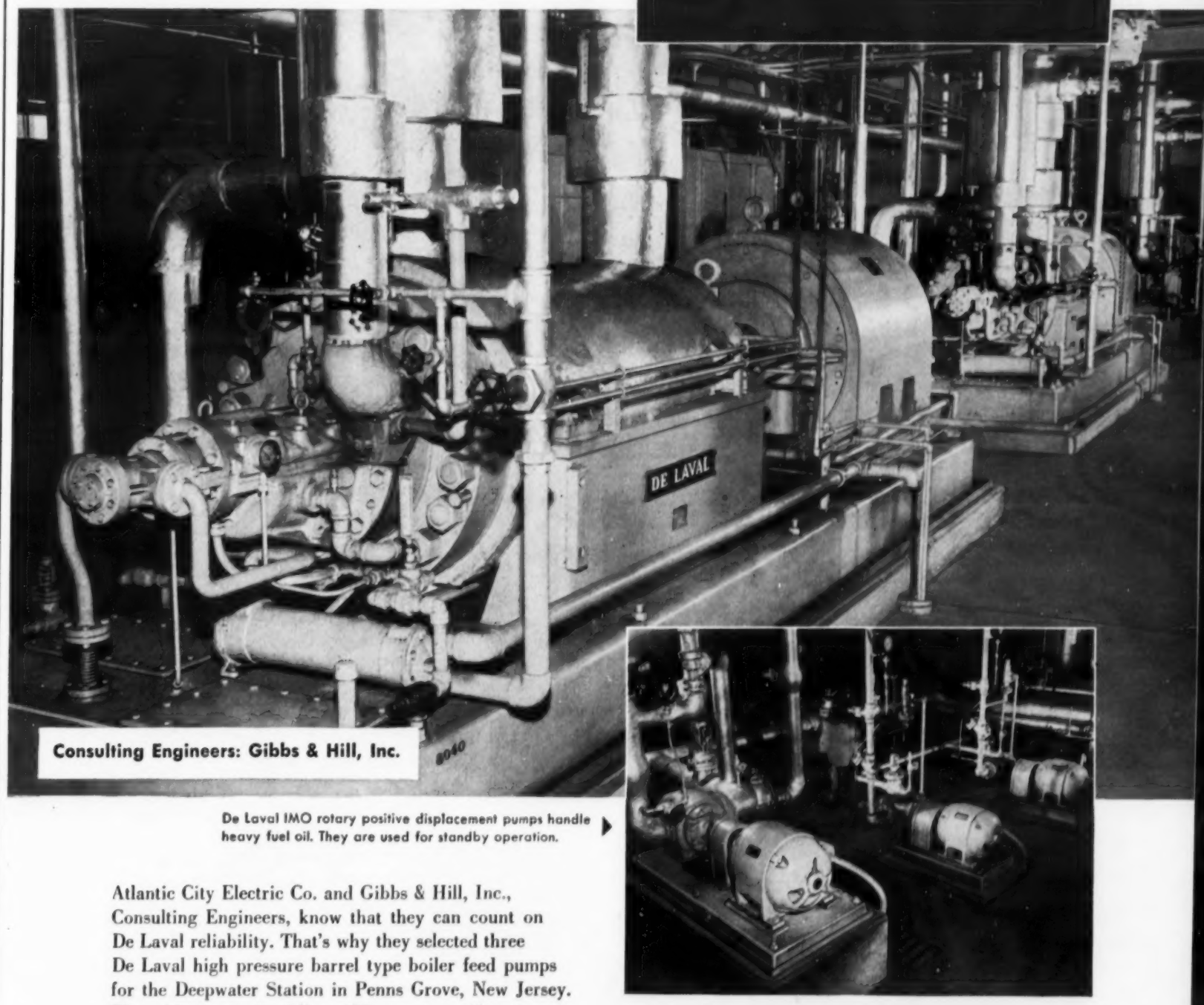
NUCLEAR-POWER BATTERY GOOD FOR AT LEAST FIVE YEARS

Elgin National Watch Company and Walter Kidde Nuclear Laboratories have jointly developed a miniature nuclear-powered battery about the size of a thumb tack head that will deliver approximately 20 microwatts. Decay energy of beta-emitting radioisotope is harnessed in a two-step energy conversion process: beta particles emitted from a mixture of finely divided phosphor and an oxide of Promethium 147 (an abundant nuclear fission product) is absorbed by phosphor and converted into red and infrared light. This light is next captured by two or more photocells and transformed into electric current. Device is completely safe for personal use without special precautions. Hearing aids, miniature portable radios, and civil defense warning receivers are expected to be among the first applications. ♦♦

". . . Wait a bit, Joe — We'll turn on the steam and when you've worked up a sweat maybe we can slip you out!"

Atlantic City Electric . . . another utility using

DE LAVAL
BARREL TYPE BOILER FEED PUMPS



De Laval IMO rotary positive displacement pumps handle heavy fuel oil. They are used for standby operation.

Atlantic City Electric Co. and Gibbs & Hill, Inc., Consulting Engineers, know that they can count on De Laval reliability. That's why they selected three De Laval high pressure barrel type boiler feed pumps for the Deepwater Station in Penns Grove, New Jersey. These 10-stage units deliver 675 gpm, operating at 1762 psi with temperature at 287 F. The pumps are driven by 900 hp motors.

De Laval barrel type boiler feed pumps operate at pressures up to 5500 psi. These units offer many important design advantages, such as double volute diaphragm, individual diaphragm bolting, only one inner high-pressure joint, and bare shaft construction. Their dependability is proven by year in, year out service in public utilities and industrial plants.

Send for De Laval Bulletin 1506, which contains helpful data.

DE LAVAL *Boiler Feed Pumps*

DE LAVAL STEAM TURBINE COMPANY
857 Nottingham Way, Trenton 2, New Jersey

Circle 121 on READ-N-CIRCLE card for more data

DL-349

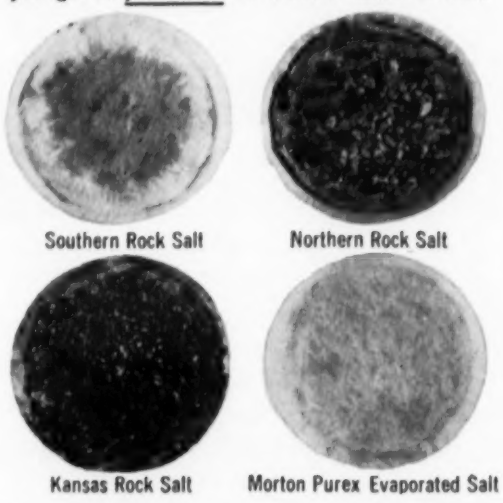
Switch to sludge-free Purex Salt

In every 100 lbs. of rock salt you buy you assume the risk of paying for up to 5 lbs. of insolubles or sludge—shale and sulphates. This means that in a 50-ton carload of rock salt you may pay for as much as 5,000 lbs. of sludge! This insoluble matter is included in the purchase price of the rock salt and accounts for part of your freight bill. It also necessitates periodic cleaning out of your brine making system.

But when you buy Morton Purex Salt, you get high-purity evaporated salt that is made in a controlled particle size to prevent packing and channeling. With Purex, none of your purchase price or freight bill goes toward paying for insolubles or sludge.

With Purex, no time or labor is wasted in cleaning out insoluble matter from your brine making system to keep it functioning at peak capacity. For Purex is 100% soluble. Morton Purex Salt will leave no accumulation of material in either the brine or water softener tanks. It can be used in bulk wet storage systems and in the Morton Model E Brinemaker.

These filter pads (approximately 1/5 actual size) show you how much insoluble matter (sludge) you get in just 5 lbs. of various kinds of salt.



Tests for insolubles taken from these random samples show you that Morton Purex is the only one that contains no wasteful sludge, or insolubles.

For more information about Morton Purex Salt and for free, expert help on any water softening or brine making problem, write or wire:

MORTON SALT COMPANY
INDUSTRIAL DIVISION
Dept. I-J, 120 So. LaSalle Street, Chicago 3, Illinois

Circle 109 on READ-N-CIRCLE card for more data

late news

. . . about industry power

• Combination turbine plant here soon

A combined gas turbine-steam turbogenerating power plant will be built at Cordele, Ga. by Crisp County Power Commission. Exhaust from a gas turbine will flow into a steam boiler where, in combination with pulverized coal firing, it will produce steam for a steam turbine. Both gas and steam turbogenerators will be built by General Electric Co. New unit, scheduled to be in operation this year, will have a 500-kw simple-cycle, single-shaft gas turbine that exhausts into a steam boiler to develop 600-psig 825 F total temperature steam for a 12,500-kw steam turbogenerator. Maximum capability of the combined cycle, therefore, will be 17,500 kw. Gas turbine will fire natural gas.

• Develop new field coil insulating system

An "integrated" field coil with an insulating system that protects electric motors and generators against atmospheric contaminants has been developed by Allis-Chalmers Manufacturing Co. This construction is particularly suitable for applications requiring resistance against chemicals, oil, moisture, or atmospheric contaminants such as carbon black, dust, and dirt. Primary insulation in the integrated field coil construction is glass, with fibers tailored and oriented for maximum strength. Solventless, inorganic, heat-stable resins augment the glass fibers. These resins bond with coil conductors and pole surfaces so well that structure is fused together in one integral part. This insulation system is available for synchronous and dc machines subject to severe duty cycling in Class A and B temperature classifications.

• Solar energy heats office building

A completely solar-heated office building, believed to be the first of its kind in this country, has been opened in Albuquerque, N. Mex. Gross building area is 4300 sq ft. Collector panels have a total area of 790 sq ft, giving a floor-to-collector area ratio of 5.45 to 1. Flat plate aluminum collectors, made by Western Brass Mills' Roll-Bond process, are painted with a special heat-absorbent paint and covered with a single sheet of common glass. Whole collector is tilted 30 degrees from vertical and forms most of the building's south wall. Heat storage for nighttime and low energy periods is accomplished by a 6000-gallon water tank installed underground. Mechanical system (plumbing, heating, and air conditioning) cost $17,400, or $4.05/sq ft, which compares favorably with similar local buildings.

another reader service . . . .

the LOCATOR

Turn to page 53 and you'll find a complete listing of all advertisers and the local offices they have ready to serve you. Information in a hurry is yours with INDUSTRY POWER's LOCATOR . . . .
see page 53

• Industry helps technical education

Radio Corporation of America has established the first RCA Fellowship in science teaching at Purdue University. RCA will support a Purdue staff member half-time while he pursues research toward an advanced degree. In addition, RCA will pay full-time salary during the summer and will cover expenses for all materials, supplies, and fees. RCA will support the Fellowship up to $3000 the first year and $4000 during subsequent years. University will pay RCA Fellow half-time during the academic year as a teaching assistant. Purdue and RCA officials believe this program will attract high-caliber graduate students and encourage them to stay in the teaching profession.

Goodyear Tire & Rubber Company will continue its four point aid to education program through 1957. Program will continue to provide advanced technical training for full-time local public and parochial mathematics and science teachers, to give financial aid to further education of Goodyear engineers and technicians, to increase enrollment and facilities of the Goodyear apprentice school and company-sponsored engineering squadron training program, and to provide an annual joint dinner meeting of technicians and local teachers to discuss technical subjects of current interest.

• Unloaders work two-way traffic

A new $4-million river transfer station to be erected near Wood Park, La., will transfer coal from Mississippi River barges to ocean-going ships, and phosphates from ocean-going ships to river barges. Station will handle over 2 million tons of coal and phosphates annually. Two traveling unloaders, built by Mead-Morrison division of McKiernan-Terry Corp., will each have a free digging rate of 700 tons/hr. Each will be equipped with a 6½-ton grab bucket and a retractable, air-conditioned cab that travels on a boom over the barge being unloaded.

• River Rouge plant grows more

Gross capability of the Detroit Edison Co. River Rouge Power Plant will be increased to 840,000 kw by addition of 320-mw Unit 3, scheduled for operation in October. Installation will include the world's largest single-shell surface condenser, built by Worthington Corp. Condenser has 170,000 sq ft of surface. It contains nearly 22,000 40-foot long Admiralty tubes. Steam will be exhausted from an Allis-Chalmers cross-compound reheat turbogenerator designed for 2400-psig, 1050 F steam at the throttle. It is rated 320,000-kw capability at 1.0 inch Hg. absolute backpressure. Net plant heat rate of 8260 Btu/kwh is expected from No. 3 Unit, some 260 Btu lower than for Units 1 and 2 (each 260-mw capacity). ♦♦

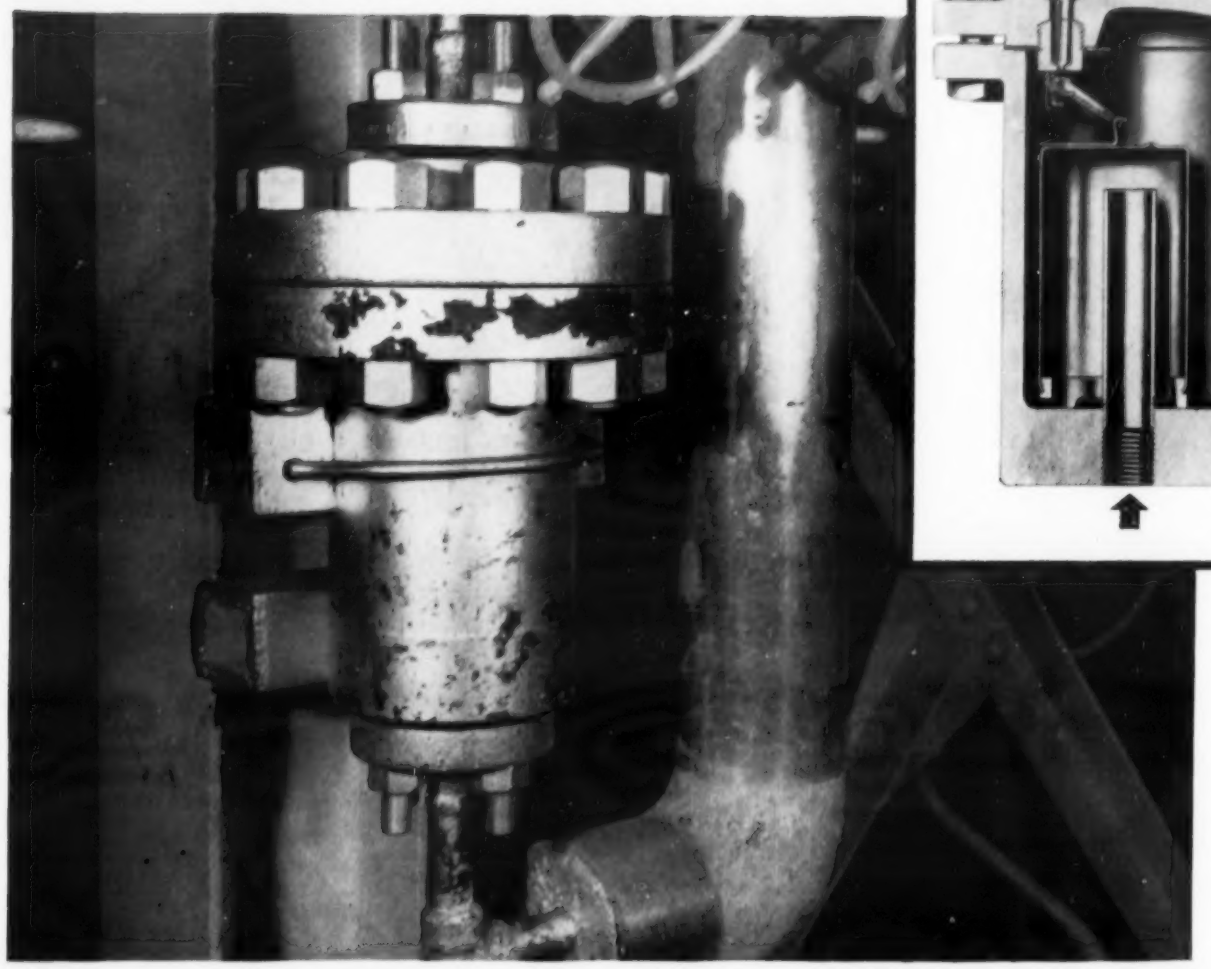
In water conditioning... there's one way to be sure!

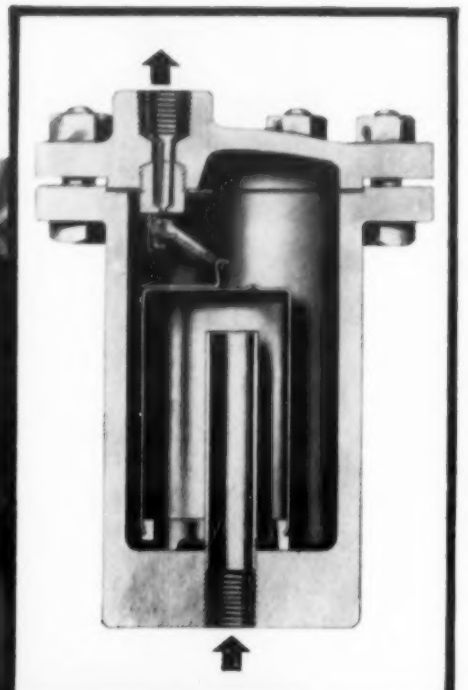
BETZ

CONSULTANTS ON INDUSTRIAL WATER PROBLEMS

W. H. & L. D. BETZ, Philadelphia, Pa.

ARMSTRONG FORGED STEEL STEAM TRAPS . . .





. . . the Best Answer to Superheated Steam Line Drainage, because:

LIST OF MATERIALS
ARMSTRONG FORGED STEEL TRAPS

Part	Material
CAP AND BODY FORGINGS	
Up to 600 psi, 750°	1030 carbon steel
Up to 900 psi, 900°	ASTM Spec. F-1 carbon moly steel
Up to 2500 psi, above 900°	ASTM Spec F-5 chrome moly steel
VALVE AND SEAT	Type 440 chrome steel, heat treated, standard. Stellite available.
LEVER MECHANISM	Stainless steel
BUCKET	Stainless steel
BOLTS	Class C high tensile, high temperature bolting material—125,000 min. tensile.
NUTS	Hex, semi-finish, heat treated for high pressure, high temperature service.
GASKET	Compressed graphited asbestos
INLET TUBE	Wrought iron

1. **Proved** in service in leading power plants throughout the world at pressures to 2400 psig.
2. **Experience** of Armstrong in design, manufacture and application dates back to the *beginning* of the trend to higher and higher pressures.
3. **Automatic** safety assured because of high capacity for warm-up loads; traps don't "forget" to drain the lines, and Armstrong traps *always* open for condensate.
4. **Economy** assured because of high value for price, long life with infrequent maintenance and freedom from steam loss.
5. **Quality** of workmanship and materials that is backed by a "complete satisfaction or your money back" guarantee.

SEND FOR THIS LITERATURE:

1. Should we trap superheated steam lines? — the answers of 11 engineers who have used traps for this service.

2. Catalog J — complete data on forged steel traps and steam trapping.

Application Engineered
STEAM TRAPS

ARMSTRONG MACHINE WORKS, 8204 Maple Street, Three Rivers, Michigan

Circle 150 on READ-N-CIRCLE card for more data

Industry Power

Shepard-Benning Building, Saint Joseph, Michigan
Telephone: YUkon 3-5515

VOLUME 72 NO. 3 MARCH 1957

A Publication of
PUTMAN PUBLISHING COMPANY
also publishers of CHEMICAL PROCESSING, FOOD PROCESSING, and FOOD BUSINESS
111 E. Delaware Place, Chicago 11, Ill.
Cleveland — Detroit — Los Angeles — New York — Pittsburgh
Portland — San Francisco — St. Joseph, Mich. — St. Louis

EDITOR AND PUBLISHER
John Paul Taylor

EDITOR
Harold A. Bergen

MANAGING EDITOR
Donald Hartley

ASSISTANT EDITORS
Robert W. De Moss
John R. Runyan

PRODUCTION EDITOR
Frank C. Donohue

WEST COAST EDITOR
Karl Robe

EDITORIAL ASSISTANTS
M. B. Pratt
E. C. Larsen

PRODUCTION
Alfred T. Thornycroft
Manager of Publications
S. J. Hauch

MARKET SERVICES AND CIRCULATION
Vincent F. Donohue
Manager of Market Services
L. A. Crabtree
E. G. Dlouhy

BPA NBP

Microfilm editions of INDUSTRY POWER are available to libraries through University Microfilms, Ann Arbor, Mich.

Four indexes for your convenience

- Major articles are indexed on title page. See page 5.
- Advertisers' nearest sales and service offices are indexed alphabetically. See pages 53 and 54.
- Advertisements are indexed by products in handy guide. See page 49.
- Important literature is indexed by products. See page 32.

this month's comment . . . .

match wits with experts . . . . at the American Power Conference

Editors attend many conferences. They develop a selective ear as they listen to paper after paper being presented and discussed. A critical eye, too, is developed by the editor who strains many a time to decipher exactly what some of the slides mean when the speaker flashes them on the screen.

Another part of the anatomy takes quite a beating at these conferences, too. Our editors can attest to the truth of that adage . . . "The brain can absorb no more than the posterior can endure."

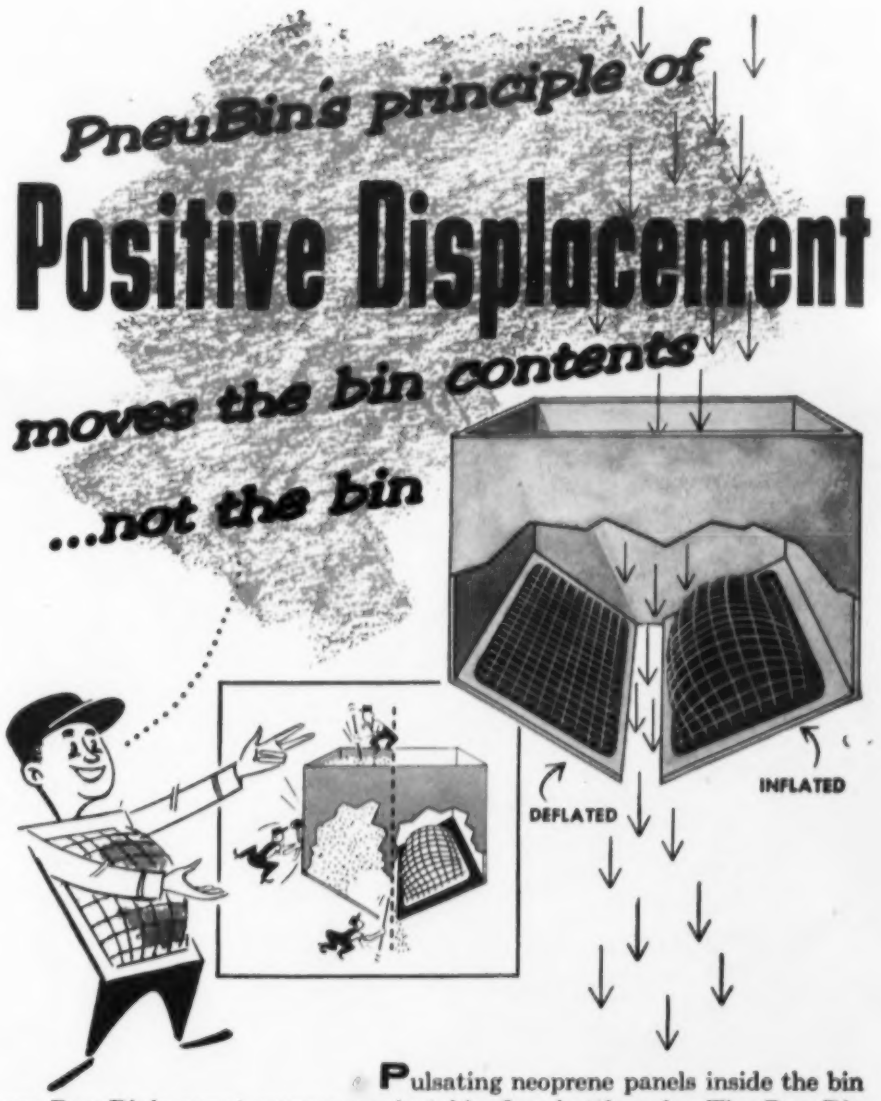
What's so important about these conferences? Why do we recommend that you attend the American Power Conference this month?

First, it is the only national conference held in this country exclusively devoted to the subject of Power Services.

Second, in addition to the papers presented, you get firsthand the frank comments, the criticisms, the additional data that comes in the discussion period following each paper. If something strikes you as particularly hot, you can follow it up right away with the man who gave the paper.

Third, you'll get to know the men. You meet them at the luncheons, at the sessions themselves, and even in the bar. You'll make friends, exchange information, find out who's doing what—and possibly find out the answers to some problems you have in your plant.

So, while we do suggest you come equipped with a selective ear, a critical eye, and a reinforced rear—we think you can gain much by coming to the American Power Conference. We hope to see you there, at the Hotel Sherman, Chicago, March 27 to 29.



Pulsating neoprene panels inside the bin are PneuBin's secret weapon against bin flow bottlenecks. The PneuBin unit consists of steelbacked, neoprene, pulsating panels mounted on the inside wall of your present bins . . . and air controls to regulate the panels' action. By the pneumatic inflation and deflation of the PenuBin panels, the bin contents are positively displaced to insure free flow. After the panels have deflated, the air control unit (operating off the regular plant air supply) starts another cycle of inflation and deflation. The process continues *automatically* at whatever frequency is set on the air controller (this frequency is adjustable).

Because the neoprene diaphragm is resistant to oils and most chemicals and is also thick and tough enough to withstand severe abrasive service, PneuBin is applicable to most any bin flow problem.

Sizes: PneuBin panels are available in ten standard sizes from 4" x 12" to 24" x 72". Special sizes can be made if required in quantity.

Send for "Flow Stoppage Report" and free literature. PneuBin engineers will gladly make recommendations, with no obligation on your part.

GEROTOR
MAY CORPORATION
OWINGS MILLS, MARYLAND

MANUFACTURERS OF—

Hydraulic Pumps and Motors

Variable Speed Hydraulic Transmissions

PneuBin—Pneumatic Bin Evacuators

Circle 123 on READ-N-CIRCLE card for more data

Delaware Power & Light Company
is beginning to test fire a new breed of fuel.
From an exclusive interview with IP editors,
here is how D P & L is . . . .

FIRING FLUID COKE

IP Staff Photo

Fluid petroleum coke is transported from refinery (background) through these three 5-inch pipelines.

C. F. PARCELS
General Superintendent of Electric Production
Delaware Power & Light Company

with Donald Hartley, Managing Editor

A NEW FUEL, fluid petroleum coke, is going to be fired this month in a power station that has been designed and built primarily for it. Delaware City Power Station, 17 miles south of Wilmington, Del., belongs to the Delaware Power & Light Company and is now completed. It will supply Tidewater Oil Company's huge new refinery, known as the Delaware Refinery, with power, process steam, and treated water. Refinery, in turn, will supply the power station with fuel, well water, and cooling water.

Design and construction of the power station was handled (in collaboration with Delaware Power & Light Co. engineers) by C. F. Braun & Co., Alhambra, Calif., who also designed and constructed the refinery. Studies indicated that a station capable of supplying both power and process steam was the most reliable and economic solution. Field work was started in July 1955 and the station first went on the line in December 1956.

Boilers have been firing refinery gas and oil, until the new fuel becomes available. Refinery's process steam demand is about 800,000 lb/hr and its electric power demand is about 40,000 kw.

what is this fuel like?

The fuel itself, fluid petroleum coke, is the end product of a new refining process, developed by Esso Research & Engineering Company, that yields more gasoline and distillate fuel oil than previous processes. This coke residue is vastly different from conventional petroleum coke. It consists of small spherical particles (roughly 35 mesh) that

pour freely and are absolutely clean. In fact, when the particles are rubbed on a piece of clean white paper with the finger, no smudges remain. Fluid coke burns with less than ½% flyash and has a gross heating value above 14,000 Btu/lb. Ignition temperature is about 1400 F. Fluid coke is not dusty. It contains little volatile matter. Its analysis depends on the crude from which it is produced. One Arabian crude gives coke with 10% Sulfur and 660 ppm Vanadium. Fluid coke's grindability is about 17 Hardgrove.

TYPICAL ANALYSIS (FROM ARABIAN CRUDE)

Gross Heating Value	14,300 Btu/lb
Vol. Matter	5 to 7%
Sulfur	9.8%
Ash	0.3%
Moisture	0.5%
Vanadium	660 ppm
Chlorides	0.007%
Ash Fusion Temperature (approx.)	2550 F

The term fluid petroleum coke was coined because, in bulk, the material handles almost exactly like a fluid. Its angle of repose is extremely low and it can be transported easily by pipeline with compressed air.

Delaware Power & Light Company owns and operates the power station, which is adjacent to the refinery. Station was designed to burn a supporting fuel, since it was felt that combustion would be unstable without a 10% supporting flame. Supporting fuel is normally refinery gas although oil burners will take over if gas supply should fail. Combustion controls are such that the wide-range oil burners will always be running on low rating. So, three fuels are fired at once—about 88% fluid coke, 10% gas, and 2% oil. Recognition was given in the design for the possible future use of pulverized coal, with space left for the addition of crushing and conveying equipment, railroad tracks, dumpers, and so on.

how does fuel move?

Fluid coke is delivered from the refinery by compressed air. It comes in slugs through three 5-inch lines (one for each boiler). Transportation system was supplied by Robinson and handles 75 tons/hr, using 90-psig air at 2600 cfm and 100 F. It is fed into steel silos (not bunkers) with 60-degree conical bottoms. These silos are vented through bag filters to remove any dust. Coke delivery is controlled by control room operators. The refinery starts up delivery, which is terminated automatically by a high-level bin indicator that diverts the supply to a storage tank in the refinery by remote valve action.

Fluid coke is drawn from the bottom of these silos, over Stock Equipment Co. continuous-type scales, then down to star-type coke feeders on the operating floor. These feeders are similar to those used with coal, but have closer tolerances. The fuel then drops to the ground floor to Riley pulverizers that grind it to about 80% through a 200-mesh screen. All wearing elements of these pulverizers are faced with tungsten carbide because of the abrasive nature of this new fuel. There are three duplex pulverizers to each of the three boilers.

Fluid coke is so named because it behaves almost like liquid. Spherical particles are extremely hard.

Three Riley boilers, which were designed specifically for this fuel, are entirely outdoors. Firing aisle and drum floor have enclosures for the boiler tender's comfort since he acts as eyes for the control room operator and has to "pound a beat" around the units. Front and rear water walls of these two-drum, two-pass, slag-bottom Turbo-Furnace boilers are pinched in at the bottom to permit burners to fire at an inclined angle over the slag pool, and to provide a chamber for maximum combustion temperatures. Boilers are each rated 500,000 lb/hr at 1300 psig and 950 F.

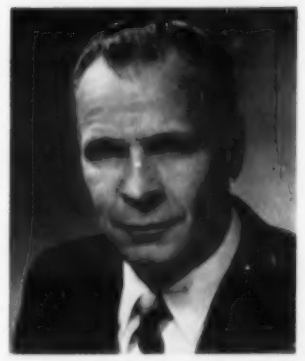
Each boiler has 12 burners, each fitted with 3 pulverized-fuel nozzles, 2 gas burners, and a wide-range oil gun. By using a large number of small nozzles, the fuel surface area exposed to radiant heat from the flame is much greater—an important point with such a high ignition temperature fuel. Opposed firing is used, down through the boiler arch into a slag pool. The downward firing burners are about 10 feet above the slag pool. Burners will also handle refinery gas and fuel oil, and pulverized coal if it is ever needed. Primary air supply to burners is at about 600 F, depending on fuel combination being fired. Refinery uses most of the gas it produces itself, so an automatic shutoff gas valve was installed to cut off supply to the power plant if it drops below 100 psig. This valve is bypassed, however, to supply gas for ignition in the event of such a pressure drop. This gas has a heat content of 800 Btu/cu ft. A separating tank in the gas line

(continues on page 36)

Errors due to faulty lighting cost money.
Here is how Los Angeles Department of Water and Power engineers design their own luminous ceilings for . . . .

the *BEST* in control-room *LIGHTING*

J. N. ROBERTSON
Electrical Engineering Associate
Los Angeles Department of Water and Power
with Robert W. De Moss, Assistant Editor



STAFF ENGINEERS at Los Angeles Department of Water and Power solve their control-room lighting problems with luminous ceilings. They design these ceilings especially for control-room application and coordinate them with other room features for unified design providing good control-room lighting.

what is good control-room lighting?

Good control-room lighting must satisfactorily illuminate all seeing tasks in the room based on visual demands of instruments, controls, and records.

Primary seeing task is to permit quick and accurate reading of glass-faced instruments at distances from a few inches to several feet. These instruments may be in vertical, horizontal, or inclined positions. They may present a multiplicity of viewing angles that complicate good illumination. Observation of closed-circuit television screens falls into this general class in many control rooms.

Second seeing task (one unique to power plant control rooms) centers on control panels, benches, and system diagram boards. Here, identification and position of control devices and condition of indicating lights must be recognized instantly.

Third seeing task is at the operator's desk where logs and similar records are kept. This work is clerical in nature, of moderately fine detail. Incidental and less demanding visual task at this location is communications and telephone operation.

Receiving station "G" control room is typical of new luminous ceiling lighting installed in seven stations.

J. N. Robertson was born in the great State of Texas in 1910. He majored in mathematics and physics at Simmons University and UCLA. After obtaining his B.S. degree, he continued with specialized courses in the field of thermal and luminous radiation. Robertson started with LADWP in 1935 as powerhouse and station operator. He transferred to the Power Design and Construction Division in 1940. During World War II, he was employed by Uncle Sam's Navy as electrical officer aboard turboelectric ships in the Atlantic theatre. Robertson is a Registered Professional Engineer in the State of California and an active member on several national committees of the Illuminating Engineering Society. He is an avid "do-it-yourself" addict, and also participates in community nonpolitical activities — that is, when he's not fishing.

Standards for control-room lighting attempt to satisfy the visual demands of these three classifications of seeing tasks that require good visibility and psychological comfort:

Good visibility suggests a term that embraces numerous complex factors. Several methods of evaluating visibility have been used. Most methods, however, are based on intangible elements and give inconclusive evaluations. After many data analyses,

(continues on page 39)

Noted fire-protection engineers give you . . . .

Nine guideposts to judge purchased power reliability

FRANK H. GAGE, President
JOHN T. W. BABCOCK, Vice President
U. S. Fire Protection Engineering Service
with Robert W. De Moss, Assistant Editor

HOW RELIABLE IS your purchased power? Any engineer responsible for electric power distribution and use within an industrial plant has the job of evaluating the reliability of his power supply. He also must maintain constant vigilance to assure that its reliability is not impaired.

What questions should you ask to make a reliability evaluation of your power supply? Here are the more important questions:

1) Is your power company management progressive and safety conscious? If utility management is progressive, then it will have a long range planning program and will be expanding generating capacity to meet anticipated demand increases. This, in itself, will prevent many potentially hazardous conditions due to overloading and to extended use of old equipment. If utility management is safety conscious, it will instill this important concept throughout the organization and will be more likely to approve expenditures for safety and fire protection measures. Management will listen to suggestions or criticisms concerning hazardous conditions offered by customers. This question is probably the most difficult to answer accurately, but its importance cannot be over emphasized.

2) How many of the utility's generating stations must go off the line simultaneously before power is discontinued to your plant? For industrial plants in large metropolitan areas, the answer may be two or more. For plants in rural areas, the answer may be one. This emphasizes the need for a complete evaluation of the hazards existing in the one generating station upon which you depend. Interconnecting networks between generating plants in rural areas are rapidly being developed. Generating stations owned by different utility companies are being continually interconnected to assure service continuity to each company's customers. Customers must insist on such interconnection if their supply is dependent on only one generating plant.

Oil-immersed switch fire destroyed telephone lines causing extensive damage before help was summoned.

3) Where are the critical generating stations located? Are they unduly exposed to the destructive forces of nature or other external conditions? Ask a few pertinent questions: Are critical generating stations located in one general flood area? (What effect would flood have on their operation?) Are any critical stations exposed to severe fire and explosion hazards? Are any located near an airport? (If so, what is their location with respect to normal flight patterns?) Are critical equipment, materials, and fuels stockpiled adequately to maintain operations during periods of strikes, floods, and other potential interrupting occurrences?

4) Has each increase in the generating capacity of existing utility stations been completely engineered? Many instances have occurred, and still are occurring, where generating capacity has been increased without increasing switchgear and other supporting equipment capacity. A breakdown of switchgear in a large public utility plant in Iowa knocked the plant out of service for an extended time. Several large industries dependent upon this one plant had to shut down until the damage could be repaired. Utility's switchgear had been so overloaded by the addition of generating capacity that a severe explosion destroyed practically all distribution equipment within the plant.

5) Are fire prevention and preventive maintenance programs adequate to minimize fires, explosions, and equipment failures at the utility station? This, again, is a relative matter. Some questions to be answered are: Are operating personnel aware of the fire and explosion problems within their plant? Are housekeeping regulations complete, and effectively carried out? Have all vital fire and explosion check items been incorporated into the preventive maintenance inspection program? (This would include spot inspections of critical equipment plus periodic testing and internal inspections.) For example, determining whether large safety relief valves or automatic control valves are in acceptable working condition by only a routine external check is practically impossible. What procedures have been established for handling solvents and other flammable liquids and for controlling welding and other construction work around hazardous areas?

6) Are fire protection measures and fire fighting facilities at each utility station adequate to protect generation continuity against effects of fires and explosions? Probably the first step in answering this question would be to determine which operations are most vital to operating continuity . . . . and then to analyze their inherent fire and explosion hazards. Next, determine whether existing fire protection is adequate for hazards involved. A small hazard in a vital operation may be more critical than a severe hazard in a nonvital process.

These specific questions might be applicable: Is adequate water available for fire fighting and for supply to fixed fire protection systems? Are hydrants and fire hose stations sufficient and accessible? Has fixed water spray or fog protection been provided for critical, oil-filled transformer banks? Has sprinkler protection been provided for critical areas in the coal handling system and for major combustible storage areas? Has fixed carbon dioxide protection been provided for the critical switchgear and primary generators? Has foam or other suitable protection been provided for fuel tanks, flammable liquid handling equipment, and for areas where oil or flammable liquid spill fires may occur? Does the plant have adequate fire and trouble detection and alarm systems?

7) Does the utility have a complete and well-planned emergency program? Has the utility anticipated and studied all emergency conditions that could possibly occur? Have they developed a complete procedure for minimizing the effects of each? Does the utility maintain mobile substations?

8) Are the lines supplying your plant wholly reliable? Naturally, the importance of a supply line is reduced if the plant is supplied by two independent lines feeding from independent sources, and if each has sufficient capacity to meet the plant's demand. Most industrial plants, however, are still

(continues on page 42)

Whether it's coal or coconuts,
your scales are actually weighing money. So . . . .

CHECK YOUR SCALES

ARTHUR SANDERS
Executive Secretary
National Association of Scale Manufacturers
with Robert W. De Moss, Assistant Editor

INACCURATE SCALES DON'T TALK . . . . they just continue to grind out false results that can cost money and cause trouble. A Wisconsin weights and measures inspector cites an example showing how expensive, in dollars, inaccurate weighing can be. He tested a 10-ton coal retailer's scale, used to weigh truck-load sales. He found a progressive error of 0.7% in under-registration. The retailer had given away 173 tons of coal in one season because of this error. His annual audit confirmed this loss—above normal shrinkage. His loss at $20 a ton was $3460—a high yearly price to pay for an unreliable scale. Whether you sell coal or must show an operating statement for your plant . . . . such errors can be more than embarrassing.

Importance of weighing coal and other fuels accurately in as-received condition, or just prior to firing for power generation, is becoming increasingly appreciated. First step in preventing weighing errors is to recognize what they are and why they happen.

Small weighing errors, multiplied by hundreds of thousands, can quickly mount to astonishing figures. The larger the volume, the greater the error. Excessive fuel use (because of scale errors) gives away inventory in the same way as the coal dealer's weighing error.

what would your cost be?

Just figure what 1% of your annual fuel bill would be. Imagine this as overpayment due to scale errors. You can compute approximately the annual cost on each of your scales at an error of 1%. Another approach to consider is this: a scale used 100 times a day with an error of 1 pound per weighing at 10¢/lb will cost $3650 a year. If the error is 5 pounds, the cost will be $18,250. Many scales, of course, operate a great deal more often than 100 times a day. Busy engineers often take for granted that their scales are correct and don't bother with computations that reflect the importance of accurate weighing.

Scales, even the ruggedly built ones used in weighing bulk materials like coal and fuel oil, are precision instruments. Normal conditions under which scales operate are extremely bad. Engineers responsible for weighing materials must become aware of the losses that faulty weighing can cause.

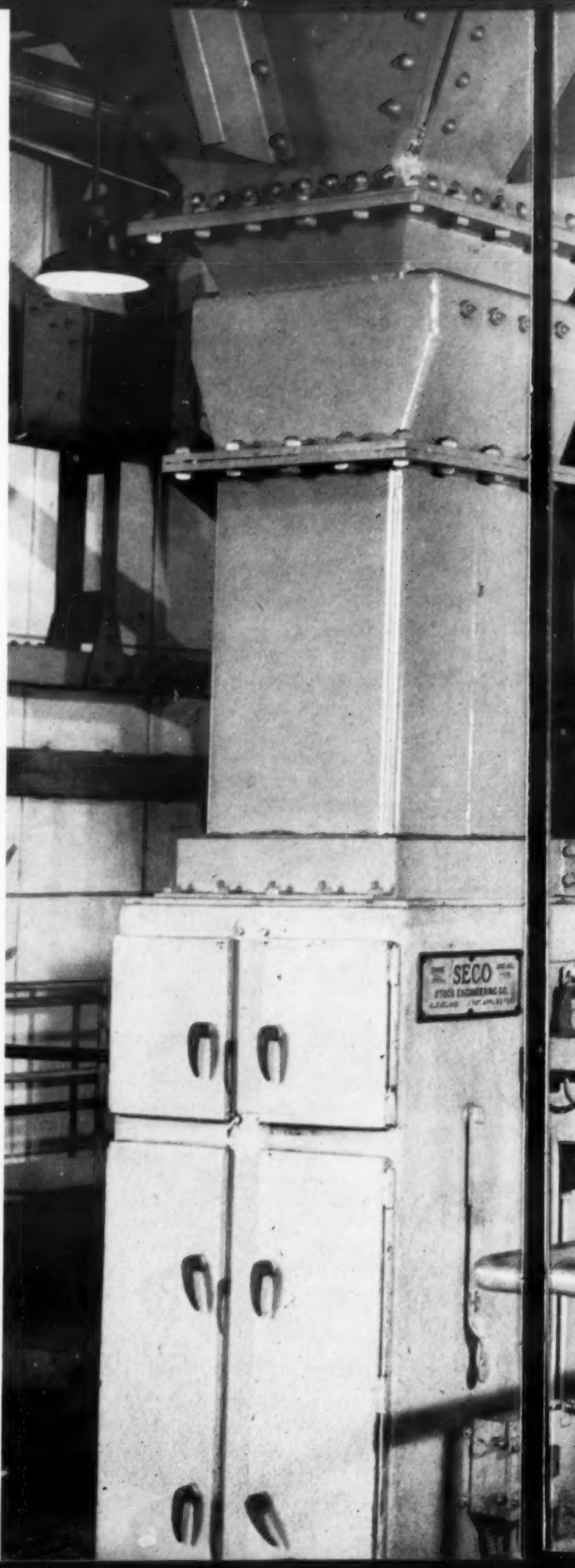
Mechanical equipment in efficient power plants is carefully maintained and replaced at proper economic intervals. The same rule must be applied to all scales. In considering a maintenance and replacement schedule for scales, remember that weighing economics are primarily governed by value of product weighed. Initial scale cost and maintenance costs are only a minor fraction of the possible scale error cost.

control plant accounting

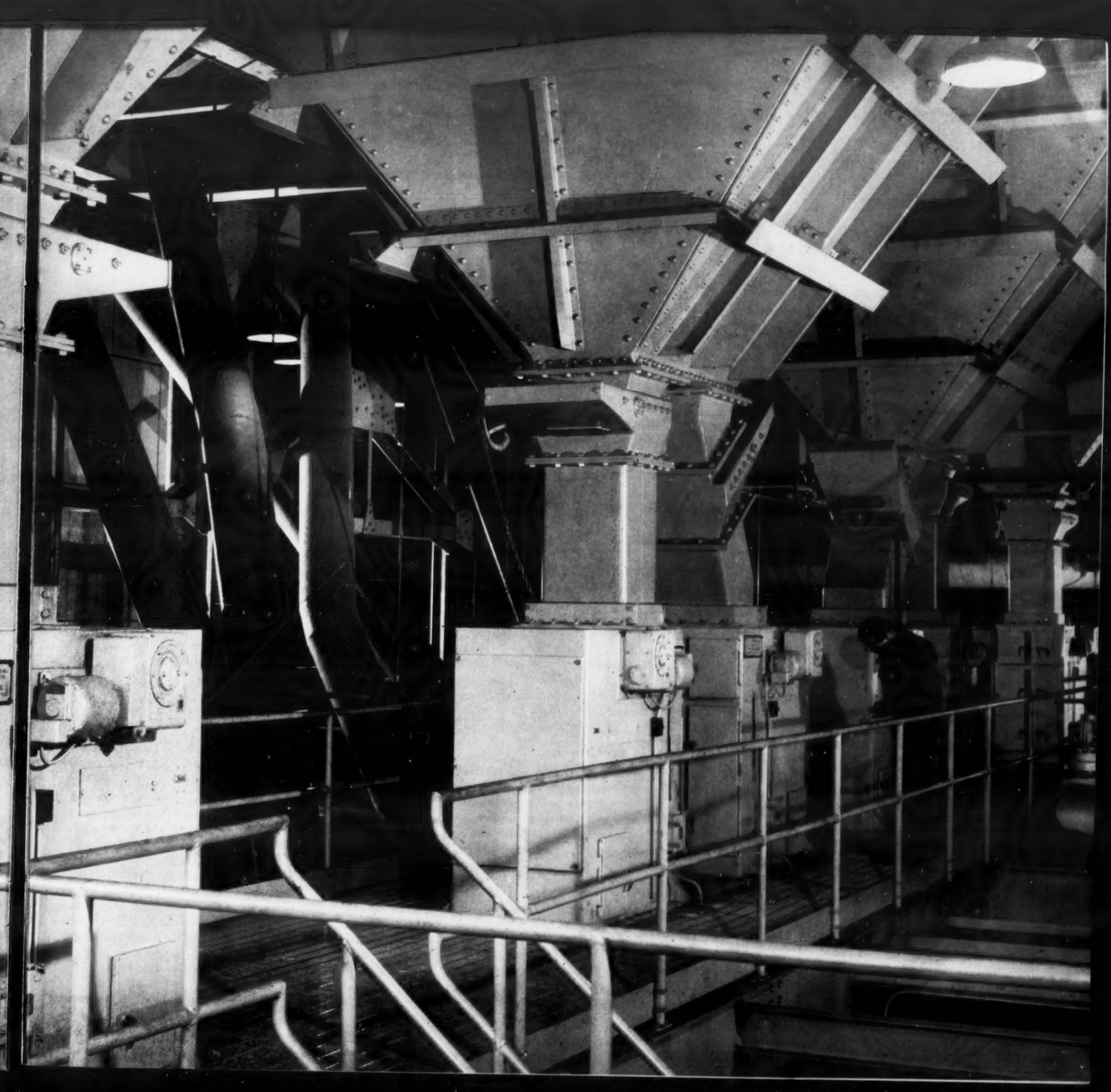
Weighing power plant fuels has developed to a high degree. Scales are tools for controlling plant operating efficiency in addition to other uses such as receiving, interdepartmental, and inventory accounting. To begin with, power plants pay huge sums for fuels purchased and for freight charges. They should not pay for materials not received. Sound business judgment and experience establish the policy that the purchaser should not depend entirely on shipper's or carriers' weights. Their scales may have been unreliable or human errors may have affected their weights. No one will deny that you are entitled to all you pay for. The best way to be sure is to check incoming net weights on appropriate receiving scales. This step not only will pay for its cost—it will pay dividends.

Power plant receiving scales are generally of two types: railroad track scales to weigh cars before unloading, and totalizing conveyor scales to record weight during unloading and transfer to ground

(continues on page 44)



Coal scales in a modern power plant require frequent checking and maintenance to prevent errors.



POWER BASICS FOR TODAY'S INDUSTRY

Engineering Economics - - II

The money tree

EUGENE S. FERGUSON
Associate Professor of Mechanical Engineering
Iowa State College

with Donald Hartley, Managing Editor

Most engineers spend a lot of their time in spending their company's money. And in planning how to spend more of it. The main question is "Will it pay?". You can use this series to help you decide. The basic facts are not difficult to digest. They are presented here in separate chapters and will be reprinted in inexpensive booklet form when the series is complete.

WHEN WE DECIDE on a course of action that involves spending money, we usually consider several alternative possibilities. If intuition is our only guide, we can expect to make about as many wrong guesses as right ones. Failure to recognize that the value of money is inseparably associated with time can make our figures range all the way from misleading to downright false.

If we properly apply the principles of engineering economics (which are solidly based on the time value of money) to our problem, we can be confident that we have eliminated one great and widely prevalent source of confusion and error in engineering decisions.

time value of money

If it were suggested that we spend $10,000 now to save $10,000 several years hence, we would rightfully consider the suggestion to be a bit foolish. But how about spending $5000 now to save $10,000 at some time in the future? Is that a sound idea? Here we recognize that "some time in the future" is the key to the solution. Let us use some concrete figures.

Suppose we need a turbine that costs $10,000. Then suppose we decide to spend $15,000 for a larger turbine in order to avoid buying another $10,000 turbine in 12 years' time. Are we not saving $5000? No, not if we consider the time value of money.

Instead of spending the extra $5000 now, let us invest it in a gilt-edge common stock. If our stock pays 6% each year and if we reinvest the dividends, we shall find the $5000 has grown to $10,060 after 12 years. Beside having saved no money by buying the larger turbine, we also shall have lost the advantage of 12 years' technological progress. Our final decision on spending $10,000 for another turbine can thus be deferred until we know, much better than we can ever know 12 years in advance, if the money will have to be spent at all.

this would be Utopia

So far, we are assuming no inflation, no depression, and no change in the purchasing power of the dollar. Because we are dealing with the future, this is a necessary assumption for our first calculations, at least. We may embroider this later on. But first we want to reduce the problem to its simplest terms.

compound interest

What one of today's dollars will be worth in the future is usually taken from a compound interest table. Such tables appear in many handbooks and textbooks. They are all calculated from the equation that is developed in Fig. 1. We shall call this the *compound interest equation:*

$$S = P\,(1+i)^n$$

where S = sum accumulated at end of n years
P = present worth (amount invested, or principal)
i = annual interest rate
n = number of years.

Here is a small part of a compound interest table:

Number of Years	Interest Rate		
	4%	5%	6%
1	1.040	1.050	1.060
2	1.082	1.103	1.124
3	1.125	1.158	1.191
4	1.170	1.216	1.263
5	1.217	1.276	1.338
6	1.265	1.340	1.419
7	1.316	1.407	1.504
8	1.369	1.478	1.594
9	1.423	1.551	1.690
10	1.480	1.629	1.791
11	1.540	1.710	1.898
12	1.601	1.796	2.012

Note: Table gives S in above equation for P=$1.00.

Example 1: How much will a dollar, invested at 6% interest, be worth 12 years from now?

We can take the figure directly from the table: $2.012. Actually, we have multiplied the *factor* 2.012 in the table by the *present worth* ($1).

Example 2: How much will $450, invested at 4% interest, be worth 5 years from now?

Factor is 1.217; *present worth* is $450.

$450 × 1.217 = $548.

We now have the first idea. Leave complications

COMPOUND INTEREST EQUATION

$$S = P\,(1+i)^n$$

An equation to find sum S that will be accumulated at the end of n years if present worth P is invested at annual interest rate i, and if all interest is reinvested as soon as earned.

Accumulation at end of year

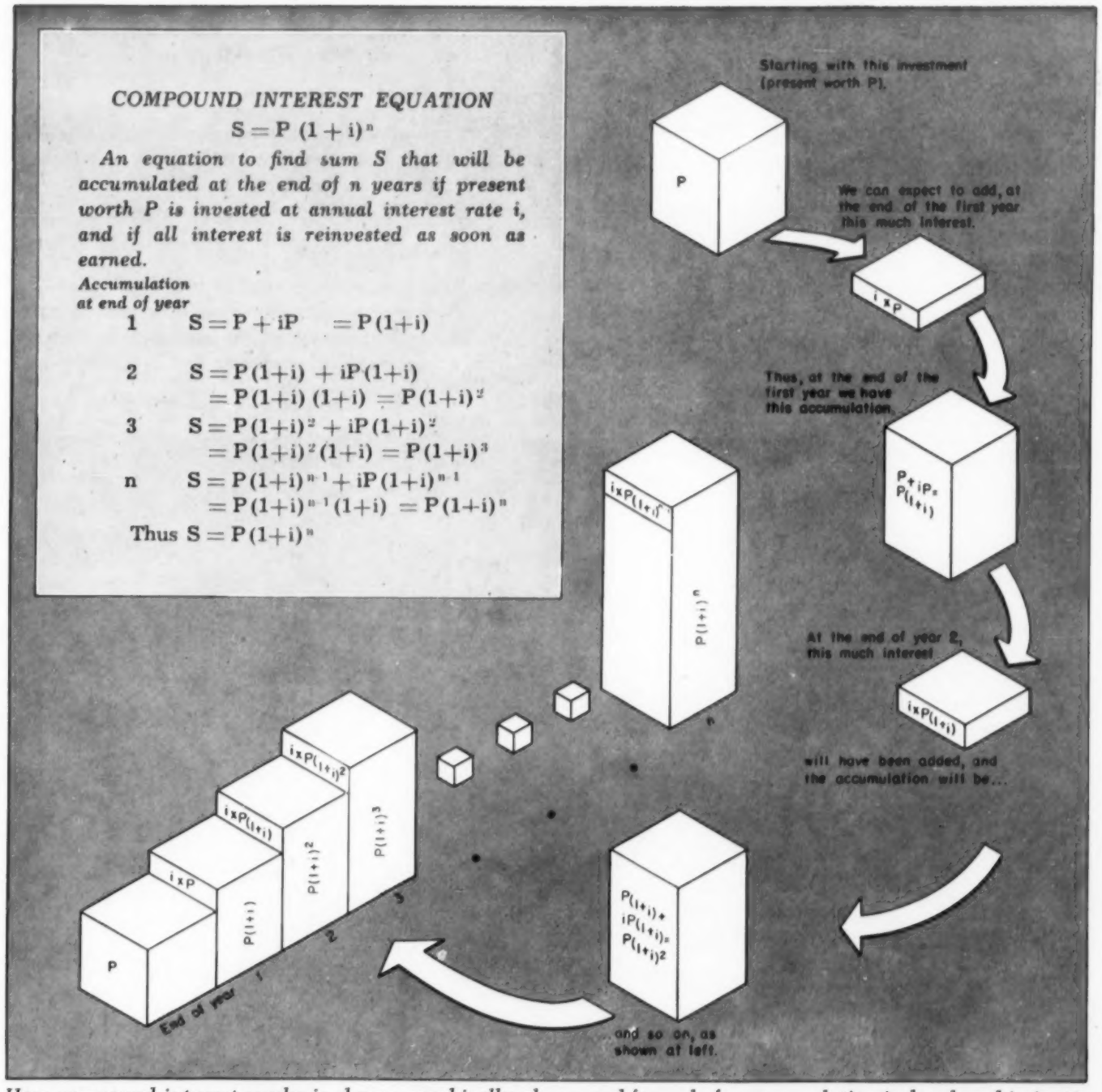
1 $S = P + iP \quad = P(1+i)$

2 $S = P(1+i) + iP(1+i)$
$= P(1+i)\,(1+i) = P(1+i)^2$

3 $S = P(1+i)^2 + iP(1+i)^2$
$= P(1+i)^2(1+i) = P(1+i)^3$

n $S = P(1+i)^{n-1} + iP(1+i)^{n-1}$
$= P(1+i)^{n-1}(1+i) = P(1+i)^n$

Thus $S = P(1+i)^n$



How compound interest works is shown graphically above, and formula for accumulation is developed in inset.

until later. Most of them will disappear. Try these problems while the idea is fresh. Answers are given in parentheses.

Example 3: How much would we have to invest today, at 5% interest, in order to have $1000 ten years hence? ($614).

Example 4: What rate of interest would our money earn if $100, invested now, returned $150 eight years hence? (about 5.2%).

depreciation and the sinking fund

We already have looked briefly into *fixed charges* on new equipment. These annual fixed charges depend upon equipment first cost, and not upon the time the equipment is actually used. Fixed charges are the same whether the equipment is used full-time or for only a few hours during each year.

One fixed charge is *depreciation*. Because we now recognize the time value of money, we shall use the concept of a *sinking fund* to determine the fixed charge for depreciation.

We know, of course, that anything we buy begins to deteriorate as soon as it leaves the manufacturer's assembly floor. Eventually it wears out and has to be replaced. If we were to invest a certain amount of money in a sinking fund, at the end of each year, we could use the money accumulated in our sinking fund at the end of the equipment's useful life to buy a new machine. If we know the interest rate that can be earned by money invested in a sinking fund and if we know how long our

(continues on page 22)

Safer because it's Simpler

MAGNETROL
Boiler Water Level Controls
UL
A magnetic sleeve, raised and lowered within a non-magnetic tube, "trips" or releases an Alnico permanent magnet attached to a mercury switch. Basically, this is Magnetrol.

■ Of all boiler water level controls, we believe Magnetrol to be the safest. Certainly it is the simplest.

A PERMANENT Alnico magnet, located *outside* the float chamber, links boiler water level and electrical controls. This infallible magnetic link eliminates mechanical parts normally subject to wear and fatigue failure. *Pioneered and perfected by Magnetrol,* it provides almost unlimited operating life.

The brass "No-Scale" float chamber liner, another exclusive Magnetrol feature, is self-cleaning. It actually "flexes" off scale and prevents "sticking" of the float.

These are just two of *many* advances for greater boiler safety found *only* in Magnetrol. *Standard* Magnetrol units are available for temperatures up to 750°F., at pressures up to 600 psi, for single stage (low water cut-off) or multi-level stage (pump control *plus* low water cutoff and alarm) service with as many as three separate switching actions. Special units are available for more extreme requirements.

MAGNETROL, Inc.

Mail the Coupon Now for the Facts

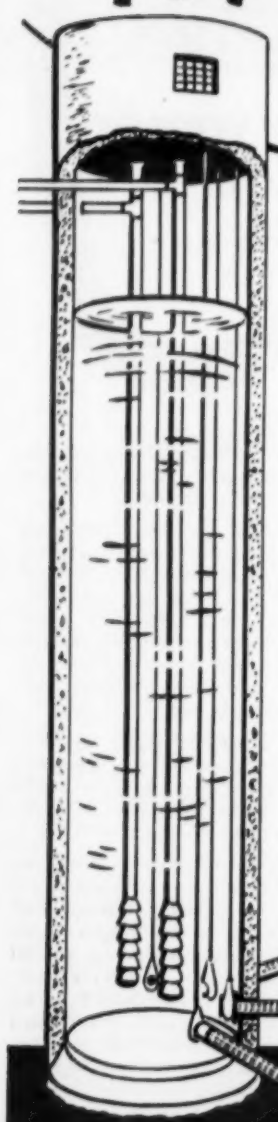
MAGNETROL, INC., 2130 S. Marshall Blvd., Chicago 23, Ill.
Gentlemen: Please send me Catalog Section III and full information on Magnetrol Boiler Water Level Controls.
Name_____
Company_____
Address_____
City_____ Zone____ State_____

Circle 110 on READ-N-CIRCLE card for more data

RANNEY METHOD

takes FULL management responsibility

AS IT SOLVES YOUR WATER PROBLEM



Now, the men at Ranney offer a complete "package plan" to handle every phase of any water supply project. The Ranney men and the Ranney Method combine to provide a WATER program for every industry and community *plus* . . . FULL MANAGEMENT RESPONSIBILITY.

IP-3

RANNEY METHOD

RANNEY METHOD WATER SUPPLIES, INC.
841 Alton Ave., Columbus 19, Ohio

Associates:
Ranney Method Western Corp.
Ranney Method International, Inc.

FREE informative new booklet. Write Today!

S. G. Allen Construction Division of Ranney Method Water Supplies

Circle 134 on READ-N-CIRCLE card for more data

equipment will last, we can decide exactly how much money must be invested in the sinking fund each year to have the exact amount needed for replacement when that becomes necessary.

Accounting people seldom use this method of depreciation but that need not concern us. It is easier to use than any other method for an economy study. It gives a yearly amount that can be compared directly with another yearly amount, regardless of differences in the equipment's expected useful life.

If you have a standard mortgage on your home you are actually applying part of your total premium into a sinking fund, even though this sinking fund payment is not labeled as such. That portion of your *first* monthly, or yearly, premium that is used to "pay off the principal" is the sinking fund payment. Let us see how the sinking fund works.

sinking fund

Most calculations are made with figures taken from tables. However, the tables are calculated from the equation developed in Fig. 3.

We shall call this the *sinking fund equation:*

$$A = S\left[\frac{i}{(1+i)^n - 1}\right]$$

where S = sum accumulated at end of n years
A = annual payment (made at *end* of each year) required to accumulate sum S
i = annual interest rate
n = number of years.

SINKING FUND EQUATION

$$A = S\left[\frac{i}{(1+i)^n - 1}\right]$$

An equation to find annual payment A that must be deposited at end of each year for n years to accumulate sum S, if money earns interest at the rate i percent per year.

Let us plan to make an annual payment into a sinking fund at the end of each year.

Accumulation at end of year

1 $S = A$
2 $S = A(1+i) + A$
3 $S = A(1+i)^2 + A(1+i) + A$
n $S = A(1+i)^{n-1} + A(1+i)^{n-2} + \ldots + A(1+i)^2 + A(1+i) + A$

Note that each annual payment A increases as for compound interest. That is, A replaces P in the compound interest equation.

Multiplying each side of this last equation by $(1+i)$, *we have*

$$(1+i)S = A[(1+i)^n + (1+i)^{n-1} + \ldots + (1+i)^3 + (1+i)^2 + (1+i)],$$

and repeating the equation for accumulation at the end of n years,

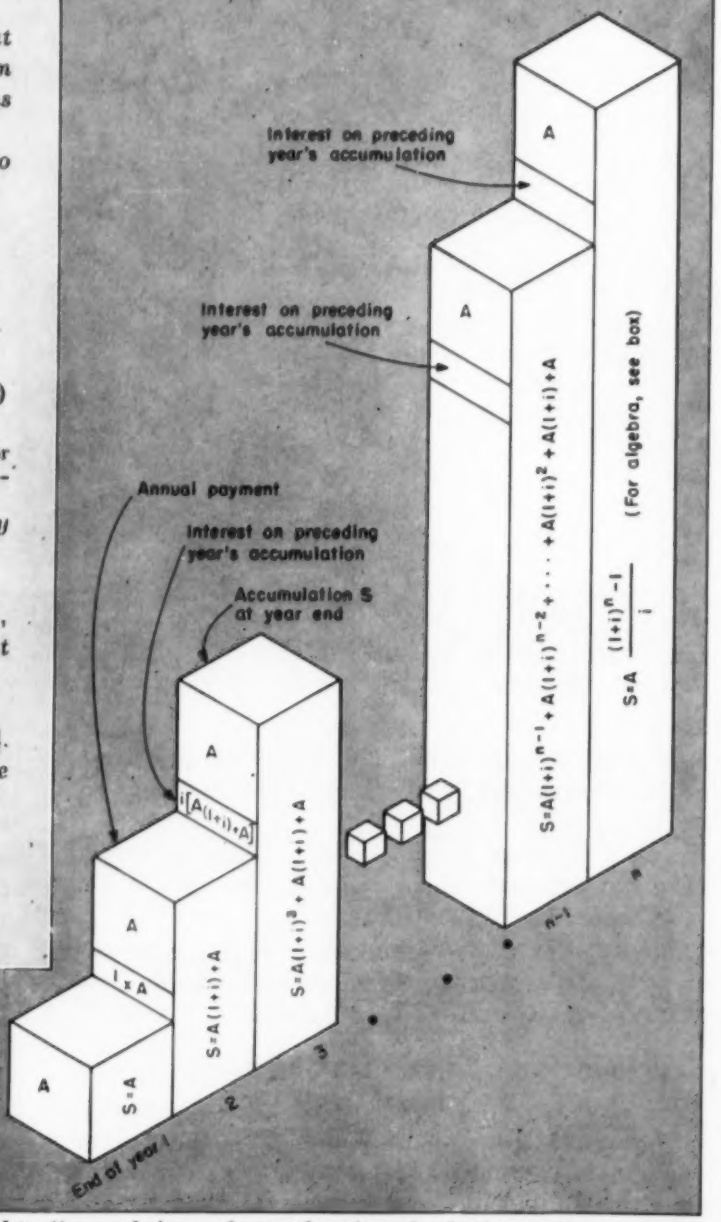
$$S = A[(1+i)^{n-1} + (1+i)^{n-2} + \ldots + (1+i)^2 + (1+i) + 1].$$

Subtracting this equation from the one above it, we have

$$iS = A[(1+i)^n - 1]$$

Rearranging, to solve for A,

$$A = S\left[\frac{i}{(1+i)^n - 1}\right]$$



Growth of money in a sinking fund is shown graphically and formula is developed algebraically in inset.

To show how the sinking fund can be used, here is a small part of a sinking fund table:

Term of Sinking Fund (years)	Interest Rate 4%	5%	6%
1	1.000	1.000	1.000
2	0.490	0.488	0.485
3	0.320	0.317	0.314
4	0.235	0.232	0.229
5	0.185	0.181	0.177
6	0.151	0.147	0.143
7	0.127	0.123	0.119
8	0.109	0.105	0.101
9	0.095	0.091	0.087
10	0.083	0.080	0.076

Note: Table gives A in sinking fund equation for S = $1.00

Example 5: How much must we invest in a sinking fund at the end of each year to accumulate $1000 at the end of ten years, if interest rate is 6%?

From table, A = 0.076. Thus, for $1000 accumulation, our yearly sinking fund payment must be $1000 × 0.076 = $76.

Example 6: A $10,000 feedwater heater is to be paid for out of fuel savings over a period of 6 years. If the interest rate on a sinking fund is 5%, how much must be invested in the fund at the end of each year in order to accumulate $10,000 at the end of 6 years?

From the table, A = 0.147. Thus, the yearly sinking fund payment must be $10,000 × 0.147 = $1470.

You will probably question whether a sinking fund can earn an interest rate of 5% or 6%. We shall see later that a sinking fund can earn *the same interest rate as the rate for which money can be borrowed.* Thus, if we can borrow money for 6% interest, our sinking fund payments also can earn 6%. This is basically the mortgage principle.

Here are two problems that will help fix the idea of the sinking fund. Answers are given in parentheses.

Example 7: If a $1000 transfer pump is to be paid for over a period of 7 years, and if a sinking fund payment of $125 is made at the end of each year, what interest rate must be earned by the sinking fund to accumulate $1000 at the end of 7 years? (About 4.5%).

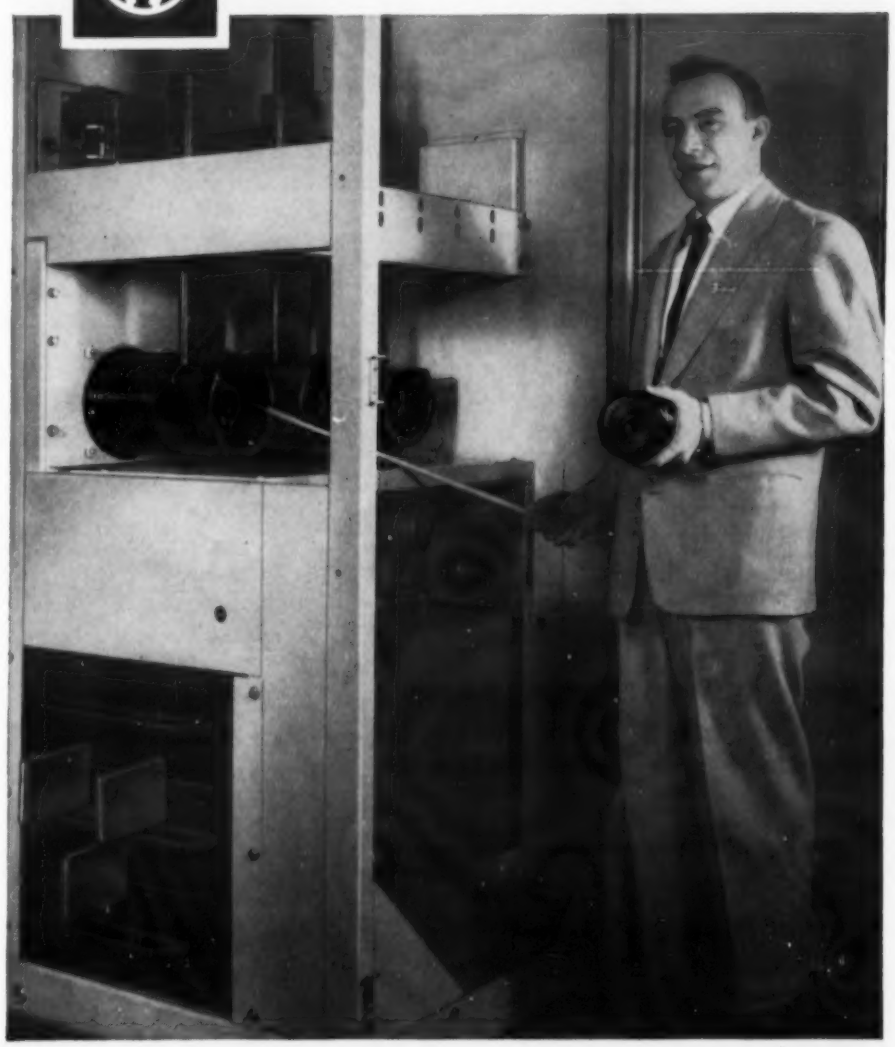
Example 8: Annual depreciation on a portable compressor is 10% of its first cost. If a sinking fund provides for depreciation, and if the sinking fund will earn 6%, what is the implied compressor life? (About 8 years).

We now have considered the idea of time value of money, which led us to the compound interest calculations. This took us to the concept of a sinking fund.

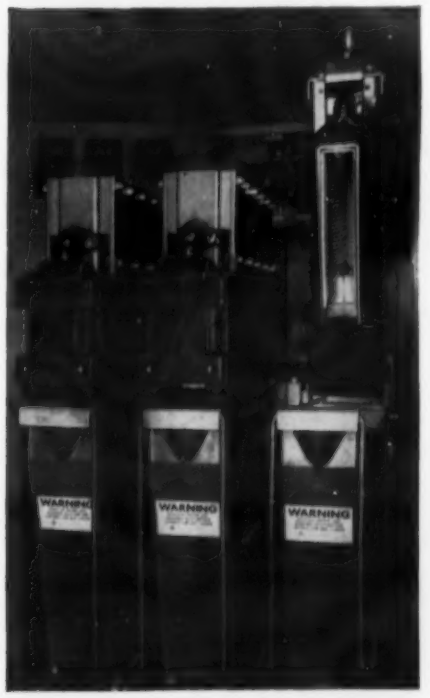
Next month, the *mortgage principle* will be the first of two concepts to be developed. Second will be the idea of *fixed charges.* Having the fixed charges in mind, we shall be ready to apply the principles to actual problems. Dollar comparisons will be shown. ♦♦

I-T-E

METAL-CLAD SWITCHGEAR



PURIFIED PORCELAIN in horizontal and vertical bus supports, primary disconnect bushings and caps and epoxy in bus joint covers provide excellent insulation, prevent fires in 15 kv I-T-E metal-clad switchgear.



EPOXY AND SPECIAL CERAMICS protect personnel and equipment by preventing fires in the circuit breaker section. Arc chute rear supports and blowout coils are epoxy. Jump gap cooling plates, arc chute liner plates, arc plates and spacers are special ceramics.

Only the finest fire-protective insulating materials

Nonflammable porcelain and ceramics, flame-resistant epoxy, and other flame-retardant insulating materials throughout, are among the extra values you find in I-T-E Metal-Clad Switchgear. Purified porcelain, of which the primary disconnect bushings and caps are made, also supports both vertical and horizontal bus. It is nonflammable, has high dielectric strength, won't track or deteriorate, is inherently contamination free.

Epoxy, which can be molded into complicated shapes, forms arc chute rear supports, blowout coils, bus joint covers, potential and current transformers. It has high mechanical and dielectric strength, is nontracking and extremely flame resistant.

Special ceramics, highly resistant to direct arc exposure, are used in jump gap cooling plates, arc chute liner plates, arc plates and spacers. These have high dielectric strength, low moisture absorption, won't track, are excellent interrupting materials. They do not deteriorate when subjected to direct arc exposure. They absorb thermal shock and deionize gases without excessive heating.

Phenolic and polyester insulating sheets and moldings, specially treated to provide the highest possible degree of flame-retardant characteristics, are also used.

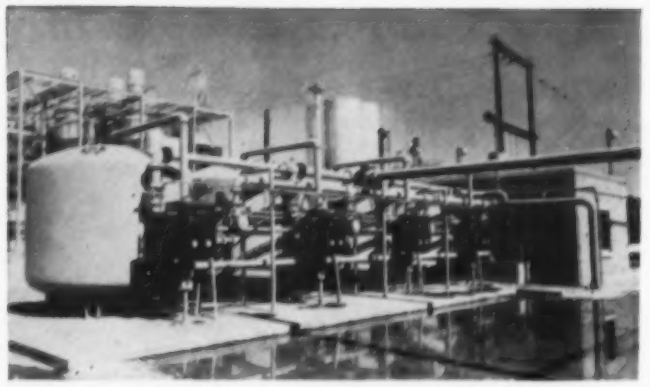
If you are planning new construction or modernization requiring electric power, consider the advantages of I-T-E equipment. Consult your local I-T-E sales office or write I-T-E Circuit Breaker Company, 19th & Hamilton Sts., Philadelphia 30, Pa.

I-T-E CIRCUIT BREAKER COMPANY • Switchgear Division

IN CANADA: EASTERN POWER DEVICES, LTD.

I-T-E

Circle 101 on READ-N-CIRCLE card for more data



BOILER FEEDWATER TREATMENT

(for over half a century)

Complete plants for water softening, demineralization, silica removal, de-oiling of condensate, clarification, de-alkalizing and all other requirements.

Send for Bulletin BFT-11
or Nearest Field Representative.

HUNGERFORD & TERRY, INC.
CLAYTON 1, NEW JERSEY

Circle 127 on READ-N-CIRCLE card for more data

new bulletins

. . . just circle key numbers on READ-N-CIRCLE card on pages 47 or 48

400-Chart simplifies insulation calculation

Useful chart converts gallon quantities into square feet of surface area to aid in estimating material needed to insulate cylindrical vessels. Eliminates complex mathematical calculations when vessels are identified only by gallon size or by length and diameter. ARMSTRONG CORK CO.

401-Pocket-size pump guide

Bulletin 5000 is a ready reference to help you decide what type pump, in what size and capacity, you need to solve your pumping problem. Includes data on pump dimensions, performance ratings, construction. Twenty pages. DORR-OLIVER INC.

402-Manual covers history, use of glass

"This is Glass" covers manufacturing methods, applications, and history of glass. Illustrated with charts, drawings, and 130 photographs. Fully indexed. Sixty-six pages. CORNING GLASS WORKS.

403-Engineering service spans 65 years

Sargent & Lundy, Chicago consulting engineering firm, reviews its services to the power industry in handsome, full-color 65th anniversary brochure. Projects include steam power stations for public utilities, power facilities for industry, substations and distribution projects, transmission line work, and nuclear power engineering. Forty pages. SARGENT & LUNDY ENGINEERS.

404-How open coil feedwater heaters operate

Deaerating and nondeaerating open coil tray-type feedwater heaters in capacities from 3000 to 300,000 lb/hr are described in Bulletin 117-A. Covers heater applications, ratings, vent condensers, counter flow principle. Twelve pages. STICKLE STEAM SPECIALTIES CO.

405-Factory-built unit substations

I-T-E unit substations permit choice of primary devices and liquid-filled or dry-type transformers. Substations consist of one or more transformers with specific devices directly connected to the primary, and metal-enclosed switchgear connected to the secondary. Forms completely integrated, factory-assembled and tested unit. Bulletin 9004-B gives complete engineering data. Twelve pages. I-T-E CIRCUIT BREAKER CO.

406-How to use spray steam desuperheater

Product Specification Sheet M55-1 describes spray-type steam desuperheaters for maximum water capacities of 5000 and 20,000 lb/hr. Two maximum operating pressures are available, 600 psig and 150 psig. Includes table of standard sizes, operating characteristics, installation requirements. Four pages. BAILEY METER CO.

407-Engineering data on tube fittings

Catalog 4310 describes Triple-Lok tube fittings in brass, steel, stainless steel, and aluminum. Shapes include swivel nut-type and straight threaded fittings with O-rings for straight thread boss. Catalog is fully indexed. Fifty-two pages. PARKER APPLIANCE CO.

408-Electric power from the atom

"Electric Power from the Atom" answers questions on atomic fuel's present status and future prospects, including importance, cost, and what is being done to develop it. Illustrated with maps, charts, and drawings. Includes work of EEI's Technical Appraisal Task Force. Thirty-four pages. EDISON ELECTRIC INSTITUTE.

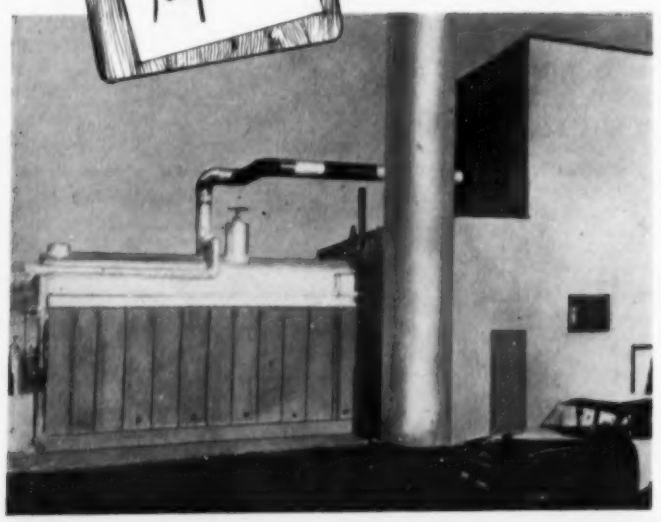
409-Pocket-size computer calculates for you

Handy Graham Computer can be used as slide rule for computations and for quick solution of formulas involving two variables and a constant. Computer's use is explained in accompanyying pocket-size booklet. Thirty-four pages. GRAHAM TRANSMISSIONS INC.

410-Package fin-tube heat-exchanger data

Alcotwin standardized heat exchangers adapt to changing load and process requirements. Standard sizes permit series-parallel combinations to suit your particular need. Bulletin FH-3 gives mechanical specifications, engineering data, dimension and type designation tables. Eight pages. ALCO PRODUCTS, INC.

on the flexibility and overload capacity of a
FOSTER WHEELER 45,000 lb/hr
PACKAGED STEAM GENERATOR



FOSTER WHEELER engineers have conducted extensive performance tests on a 45,000 lb/hr oil-fired Packaged Steam Generator installed at a large New England chemical plant.

For 30 days, the unit was operated at 42,500 lb/hr on a 24-hour basis, delivering over 1,000,000 lb of steam per day. It was also operated at 46,500 lb/hr over an 8-hr period.

Efficiency at design load of 45,000 lb/hr exceeded contract requirements of 83.2%. During performance tests the boiler was operated in excess of 51,000 lb/hr at an efficiency of 82%.

Although purchased as a base load unit, tests were also conducted to determine its flexibility. Rapid load swings from 10,000 to 51,000 lb/hr were set up while on automatic control. The boiler was able to swing from one extreme to the other in considerably less than 60 seconds.

This very satisfactory performance stems from the conservative FW design and generous water storage capacity which are important features of the entire standard line. Available in rated capacities from 10,000 to 50,000 lb/hr, with wide choice of burners and controls. For complete information, send for Bulletin No. PG-55-3. *Foster Wheeler Corporation, 165 Broadway, New York 6, N. Y.*

FOSTER WHEELER
NEW YORK • LONDON • PARIS • ST. CATHARINES, ONT.
Circle 135 on READ-N-CIRCLE card for more data

411-Motor pump performance guide

Catalog 107 covers Tuthill Type-SU pump units for handling heavy fuel oils and other noncorrosive, highly viscous liquids. Units deliver pressures to 300 psig, capacities to 2030 gph. Handy performance guides help you select best unit to fill any need. Dimensions, operating characteristics, pump and motor performance data included. Eight pages. TUTHILL PUMP CO.

412-Pocket-size commutator manual

"Carbon Brush and Commutator Maintenance" is concise reference covering maintenance requirements, factors affecting commutation, and carbon brush materials. Fully indexed pocket-size Bulletin B-6150-A includes charts, diagrams, and photographs. Thirty Pages. WESTINGHOUSE ELECTRIC CORP.

413-Engineering specs on cooling towers

Bulletin 5-1-902 describes LoLine cooling towers in Series B (7-foot, 3-inch frame height) and Series R (12-foot, 1-inch frame height). Both permit multicell arrangements and easy addition of extra cells. Includes mechanical features, cross section drawings, engineering data, tower dimensions, arrangements for tower and basins. Sixteen pages. J. F. PRITCHARD & CO.

414-Air compressor data sheet

Data sheet in new bulletin gives construction details, specifications of air compressor models in ¼- to 20-hp range. Single or two-stage Brunner air compressors have electric motor or gasoline engine drive. BRUNNER MANUFACTURING CO.

415-Valve, boiler mountings guide

Revised edition of "Guide for Selecting Valves, Boiler Mountings, Lubricating Devices," includes data on new bronze globe valves with Brinalloy seats and discs, Luncor all-molded valves, and solder-end valves. Fully indexed Circular 555 gives technical data, tips on selecting valves, boiler mountings, lubricating devices. Twenty-four pages. LUNKENHEIMER CO.

416-Boiler tube reference manual

Handy reference manual gives useful tips on care and preservation of boiler tubes, solves common boiler tube problems. Includes tables, charts, and other pertinent data. Fully indexed. Thirty pages. BOILER TUBE CO. OF AMERICA. ♦♦

Next month in Industry Power

Seventeen climates under one roof

Ditto Inc. built its new plant with an eye to every possible air conditioning contingency, yet used only standard components. Details will be in the **April issue of Industry Power**

No Storage Problem Here!

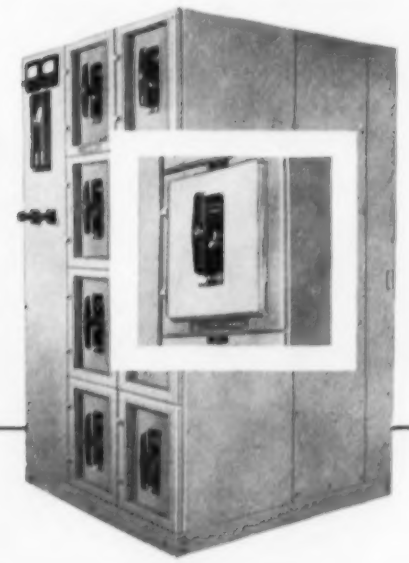
Only Allis-Chalmers low voltage switchgear permits convenient storing of breaker in its own compartment with door closed!

To give space needed when breaker is in disconnected position, center panel is reversed by simply loosening four knurled nuts. No tools are needed.

A specially contoured reversible center panel in each compartment door does the trick. When breaker is in test or completely disconnected position, the center panel may be reversed to extend outward from the surface of the unit . . . gives additional space inside cubicle.

This means no special storage space is required for breakers not in use. Handling and danger of damage during movement of breakers are eliminated.

As long as breaker is in compartment it is always firmly fastened to withdrawal mechanism and can't make contact accidentally.



Get the complete story!

There are many other desirable features in Allis-Chalmers low voltage switchgear. For details call your nearby A-C office, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

A-C ALLIS-CHALMERS

A-5169

ALLIS-CHALMERS

Circle 117 on READ-N-CIRCLE card for more data

DON'T BUY ANY

Dry-Type Transformers

UNTIL YOU GET THE

FACTS FROM

Acme ACME Electric

Getting your money's worth in buying dry type transformers is more than a matter of price. Basic design, materials and features of construction can double the value for every dollar spent.

DO YOU WANT THESE FEATURES IN THE TRANSFORMERS YOU NEED?

- ☐ Laminations of high-grade silicon steel or grain oriented stock, stacked precisely to minimize weight thus reducing exciting current and minimizing core loss.
- ☐ Coils of 99.9% pure copper wire for maximum conductivity results in minimum losses in windings.
- ☐ Wire insulated with fibre glass and impregnated with approved class B or class H binder before wound into coils.
- ☐ Class B and class H insulated transformers, designed with air duct system of cooling around coils. No hot spots.
- ☐ Low noise level.
- ☐ Sturdy steel cases that will withstand accidental damage.
- ☐ Practical and convenient connection panels to simplify installation.

If you're truly interested in transformers that are *engineered* for performance and long-life, then send your inquiry to Acme Electric. Catalog A-2 on request.

Transformers 1/10 to 1/3 KVA, autotype, 4 winding, 3 winding, Primary voltage up to 600 volts.

¾ to 1 1/3 KVA class A insulation. 2 and 3 KVA class B insulation.

5 - 7 1/3 and 10 KVA class H insulation. All standard voltage to 600 volts primary.

LARGER TRANSFORMERS AVAILABLE FROM STOCK

In addition to transformers illustrated prompt shipment can be made of transformers up to 167 KVA single phase.

3 PHASE TRANSFORMERS

Available in sizes from 3 KVA to 500 KVA. All standard voltages up to 600.

ACME ELECTRIC CORPORATION

523 WATER ST. CUBA, NEW YORK

Acme ACME Electric

TRANSFORMERS

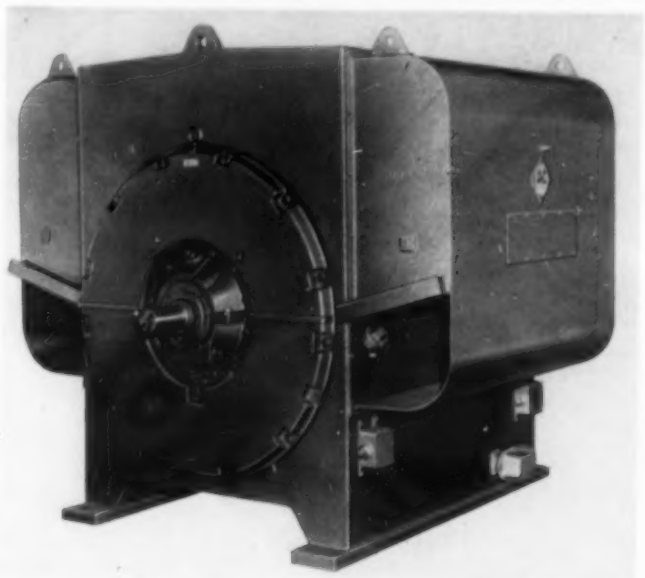
Circle 152 on READ-N-CIRCLE card for more data

new products

. . . just circle key numbers on READ-N-CIRCLE card on pages 47 or 48

700-Why weather-protected motors?

Weather-protected motors for nonhazardous outdoor installations are now available in ratings of 250 hp and larger. Motor frame houses a removable prewound



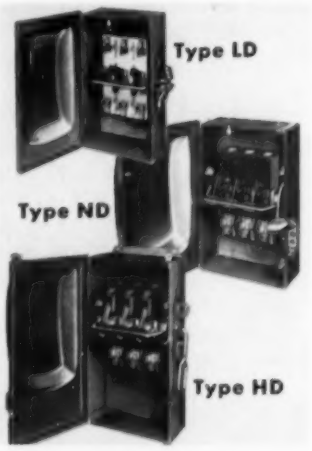
stator assembly unit. Motor's contour provides natural drainage. Stator windings can be easily inspected by removing upper half of horizontally split bearing bracket and split air deflector. Space heaters, bearing temperature relays, bearing temperature detectors, stator temperature detectors, stator winding thermoguards are available. ALLIS-CHALMERS MANUFACTURING CO.

701-Dial setting regulates torque

Air-powered tube expander is controlled by torque setting preset by operator. When desired torque is obtained, expander automatically stops rotating. Boiler tube joint tightness is always uniform, regardless of tube sheet hole variation. Boiler tube roller produces 75 ft-lb of torque — enough to roll three 3-inch 10-gage tubes in a ⅝-inch tube sheet. Unit weighs 26 pounds, has overall length of 18 inches, and a free speed of 200 rpm. Variations in lubrication, temperatures, and air pressures do not reduce accuracy. THOMAS C. WILSON, INC.

702-Safety switches meet new standards

Three types of switches now meet new NEMA standards. Type LD has range from 30 to 200 amperes in both general-purpose and rain-tight enclosures. Type ND has range from 30 through 1200 amperes in both 250- and 600-volt ac and dc, in both general purpose and rain-tight enclosures. Type HD has range for heavy duty industrial use. Watertight, dusttight, and explosion-resisting types available. SQUARE D CO.



THIS IS THE MURPHY BALL FLOAT TRAP

★ GUARANTEED

LITERATURE AND PRICES ON REQUEST

YES...

1/2" Pipe Size Only

Guaranteed to eliminate entirely all water and oil from small compressed air installations. Guaranteed as to workmanship and materials, too. Entirely mechanical and automatic. No attention . . . no wear.

Murphy *knows* compressed air. Write for our literature, or state your problem. Our engineers are at your service.

AFTERCOOLERS • SEPARATORS • STRAINERS • TRAPS
SPRAY GUNS • PISTOL SPRAYER

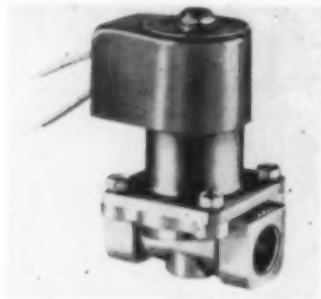
JAS. A. MURPHY & CO.

HAMILTON, OHIO, U.S.A.

Moisture Elimination Up To 3000 Pounds Per Square Inch

Circle 115 on READ-N-CIRCLE card for more data

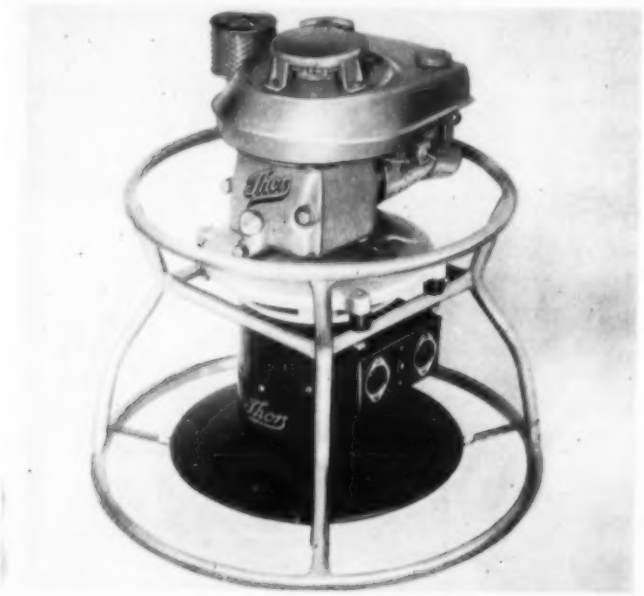
703-Solenoid valves have tight shutoff



These steam solenoid valves can be used for automatic control of steam, hot fluids, or gas flow up to 400 F. Teflon discs assure tight shutoff without maintenance problems. Internal operating parts last through entire valve life. Has no stuffing boxes. AUTOMATIC SWITCH CO.

704-Frame supports vertical generator

Tubular framework supports entire weight of new portable vertical-shaft electric generator. Weight loads normally imposed on main bearing shaft are shifted to



framework. Each of two 1500-watt models provide power at 13 amps, 115-volt ac or dc. Four-cycle, single-cylinder, air-cooled gasoline engine brings total unit weight to 95 pounds. Two plugin outlets are provided for power distribution. THOR POWER TOOL COMPANY.

(more new products on page 28)

"Can't you see the young lady's in distress idiot . . . . turn off that fan!"

Why United States Envelope Company Chose Leffel Scotch Boilers

UNITED STATES ENVELOPE COMPANY

ENGINEERING DEPARTMENT
75 GROVE STREET
WORCESTER 5, MASS.

November 6, 1956

Mr. J. Robert Groff, President
The James Leffel & Company
Springfield, Ohio

Dear Mr. Groff:

Our company, as you know, has fifteen plants in each of which we have had considerable experience with boilers over the last 40 to 50 years.

In light of this experience, and after a thorough canvass of the field, we recently purchased two of your 175 HP Leffel Scotch Type boilers. One of these was installed in our Central States Division, Indianapolis, in 1955. The other went into our National Division, Waukegan, Illinois in July of this year. Both boilers are fully automatically controlled, and are fired with combination oil and gas burners.

In both of these installations the new boiler was sized to handle the added load anticipated when construction of increased manufacturing space on owned land will equal or exceed the floor area in the existing buildings.

Our confidence in the rugged dependability, long life, and freedom from expensive repairs represented by Leffel Boilers is evident.

Sincerely yours,
UNITED STATES ENVELOPE COMPANY
W. K. Ramsey
Engineering Manager

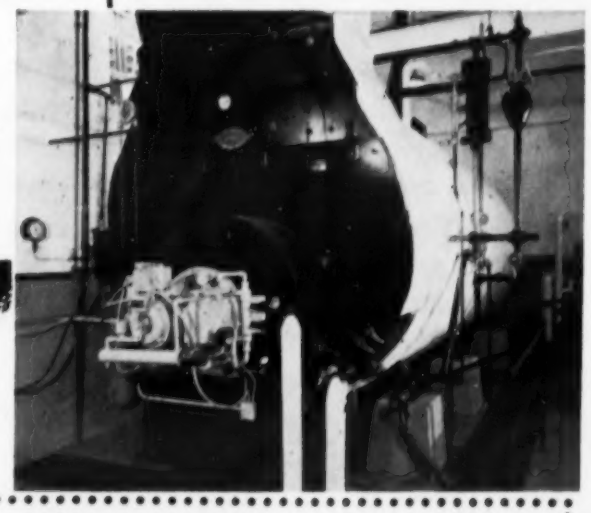
W. K. Ramsey, engineering manager for the U. S. Envelope Company, knows boilers—his company has been operating boilers for 40 to 50 years in their 15 plants.

U. S. Envelope recently purchased two 175 HP Leffel Scotch Boilers. Mr. Ramsey's letter tells you why.

When you buy a boiler, don't be misled by the exaggerated claims which are so common in today's boiler advertising. U. S. Envelope's choice of Leffel, after a careful survey of the whole boiler field, is believable evidence of the rugged reliability of Leffel boilers.

Before you buy, be sure that you have all the facts. Then you'll see why you can count on Leffel boilers for "rugged dependability, long life and freedom from expensive repairs."

Bulletin 236, free on request, gives complete details on Leffel boilers for oil, gas or coal firing. If you need help in planning your boiler installation, Leffel engineers—backed by 95 years of experience in efficient steam generation—are available for consultation without obligation. Just mail the coupon below.



A view of the combination oil and gas-fired 175 HP Leffel boiler installed at the United States Envelope Company, National Division, Waukegan, Illinois.

11-1-56

THE JAMES LEFFEL & CO.
FOUNDED IN 1862
MORE EFFICIENT STEAM GENERATION FOR 95 YEARS

FREE CATALOG
THE JAMES LEFFEL & COMPANY
DEPT. I, SPRINGFIELD, OHIO

☐ Please send me catalog and other descriptive literature on Leffel Scotch Boilers.
☐ Please have your representative call.

Name _____ Title _____
Company _____
Street _____ City _____ State _____

Circle 140 on READ-N-CIRCLE card for more data

..but for long collector life

THE AEROTEC NEW 5 RWS

Aerotec's latest development in the field of erosion resistant dust collector tubes is unique.

Aerotec engineers proved, by accelerated tests under erosive conditions many times greater than normally encountered, that of all metals tested, white cast iron assures maximum resistance to abrasion.

These tests are substantiated by actual installations. They now establish the Aerotec 5 RWS collector with white iron tubes as the ultimate in long life and sustained high efficiency in the field of mechanical collection.

If your dust collection problem requires top mechanical efficiency, discover the assurance of highest performance and long life possible only with an Aerotec 5 RWS. Call or write our Project Engineers today. They are ready to help you solve your dust control problem.

Project Engineers **THE THERMIX CORPORATION** Greenwich, Conn.

(Offices in 38 principal cities)

Canadian Affiliates: T. C. CHOWN, LTD., 1440 S. Catherine St. W., Montreal, Que.

Manufacturers

THE AEROTEC CORPORATION

Greenwich, Conn.

Circle 137 on READ-N-CIRCLE card for more data

new products

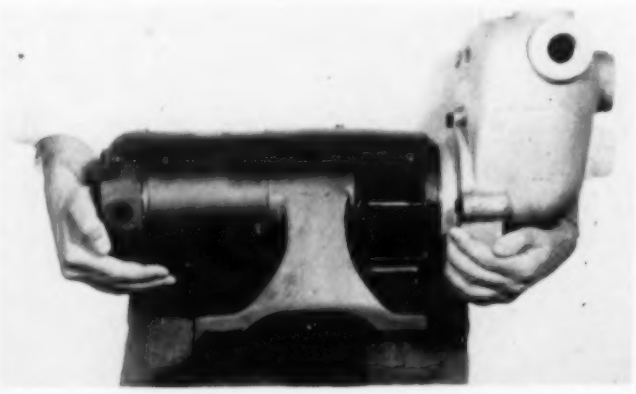
. . . starts on page 26

705-Rapid response pilot control valve

Pilot control valve used with diaphragm-actuated regulating valve responds to small variations in controlled pressures. Readjusts main regulator for precise throttling of steam, gas, or liquid flow. Adjustable pressure range is extremely broad and desired settings are easily adjusted. Controlled pressure ranges are 3 to 15, 10 to 40, and 25 to 100 psig. Pressure gages indicate inlet hydraulic pressure and load line pressure to diaphragm-operated regulating valve. Stops hydraulic leak-off. ATLAS VALVE CO.

706-Lightweight pump is self-priming

Self-priming, self-lubricating centrifugal pump is available in three ratings. New line offers a choice in



½-, ¾-, and 1-hp ranges. Features rising head-capacity performance, which makes it ideal for filter applications. WORTHINGTON CORP.

707-Stop fuel oil static hazards

Statikil chemical curbs dangerous static electricity charges generated by fuel oil flow through piping systems. Can be sprayed on piping, manifolds, storage tanks, and adjacent pipes to dissipate static. Packaged in handy self-spraying 12-ounce cans. Contains no mineral oil, radium, or harmful acids, and is nontoxic. Also available in bulk for swabbing, wiping, or spraying. An inexpensive way of insuring against fire. J. E. DOYLE CO.

PALMER
MERCURY ACTUATED

DIAL THERMOMETERS

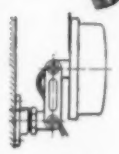
in 3 types to suit any requirements

PATENTED

Full 4½" dial face. Stem can be placed at any angle and case can be rotated to any readable position.

1 **Rigid Stem Dial Thermometer** tapered bulb, interchangeable with standard industrial thermometer separable socket. (As illustrated above.)

2 **Wall Mounted Dial Thermometer** with flexible connecting armor. Case adjustable to easy reading position.



3 **Flush Mounted Dial Thermometer** for panel mounting with flexible connecting armor.

All three types have a full 4½" dial face.

for accuracy: Mercury actuated . . . Fully Compensated by Invar Compensaton. Guaranteed Accurate 1 scale division.

for angularity: Can be adjusted to most readable position at any angle desired.

for readability: Bold Black Numbers . . . 11" of scale Reading Dial face can always be placed in easiest readable position.

for interchangeability: Always specify "PALMER" Separable sockets as they are interchangeable for Dial or Industrial type Thermometers.

WRITE FOR CATALOG INFORMATION

PALMER

THERMOMETERS, INC.

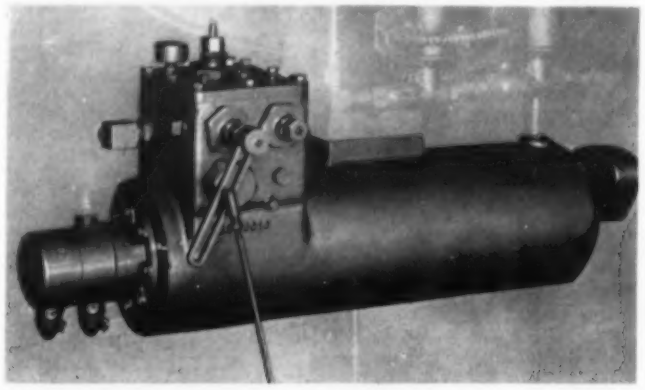
Norwood Ave., Cincinnati 12, Ohio

Mfrs. of Industrial Laboratory Recording and Dial Thermometers

Circle 102 on READ-N-CIRCLE card

708-Make cold No. 6 fuel oil behave

Heating-circulating system, designed especially for No. 6 fuel oil, prevents freezing or clogging and gumming in burner nozzle. System keeps oil in continuous circula-



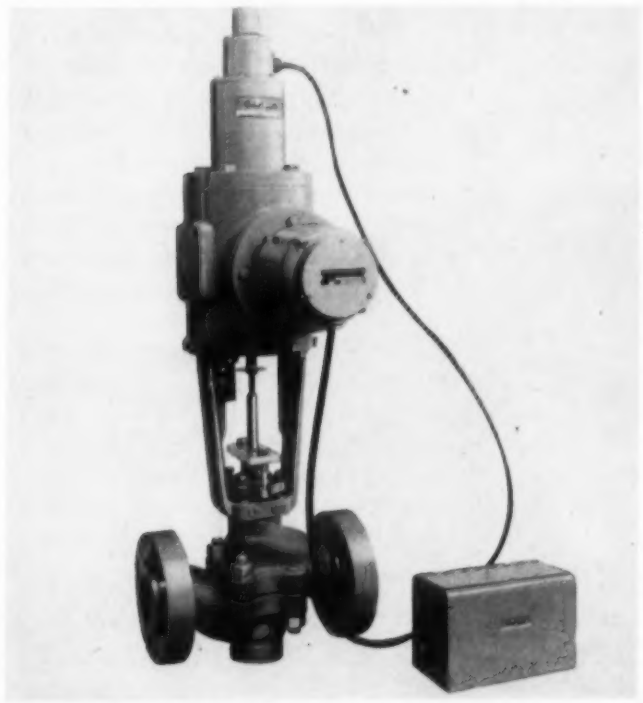
tion, compensates for variable viscosity, and heats burner nozzle. Valving and manifolding prevents over heating and provides pressure relief if oil pressure in inlet chamber reaches 125 psig. Oil pump works when flame has been shut off. YORK-SHIPLEY INC.

MORE INFORMATION

For more detailed free information on these products just circle the key numbers on a READ-N-CIRCLE card on page 47 or 48.

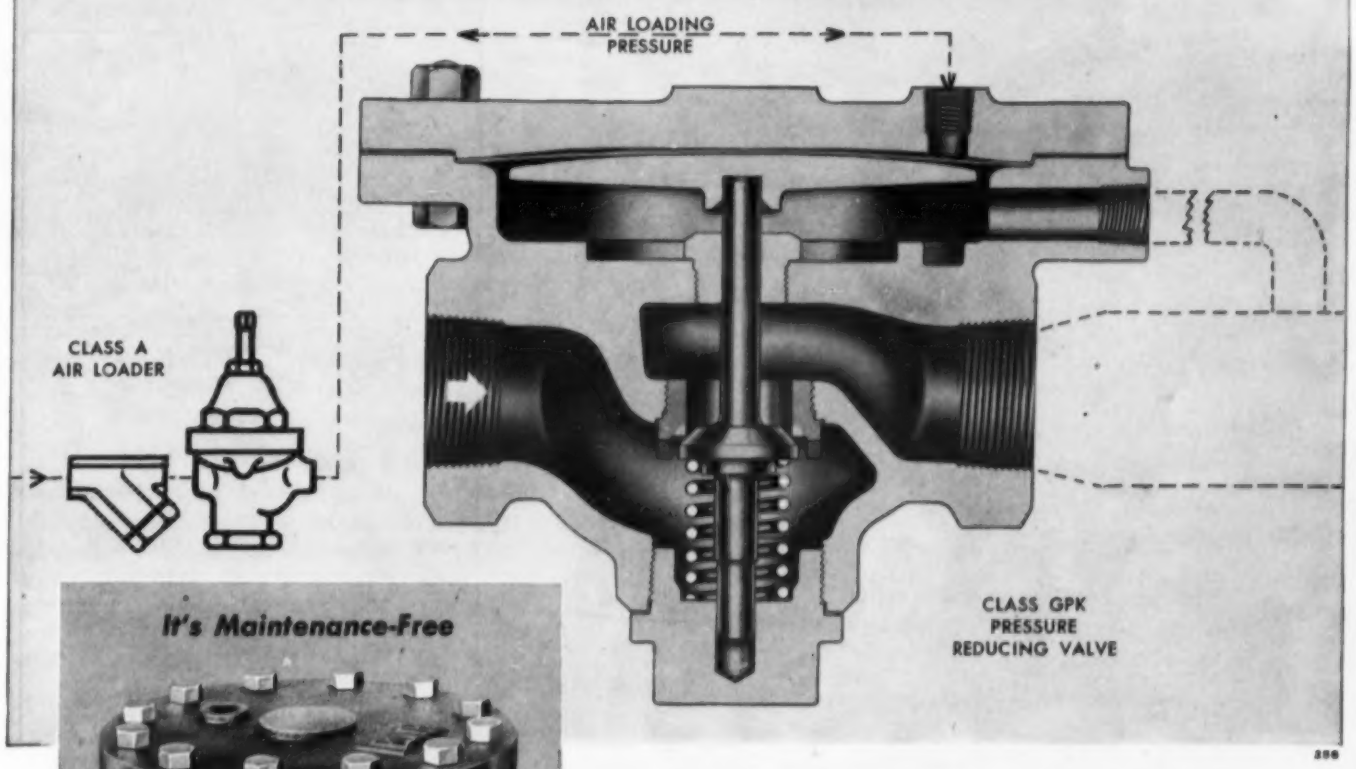
709-Electric actuator needs no fluid

Electric proportional positioning actuator requires no intermediate pneumatic or hydraulic operation. Has stroke travel from ¼ to 2 inches with stem speed of



4 in.—min at maximum rated thrust output of 500 pounds. Can be mounted in any position and is unaffected by normal vibration. Combines desirable features of all-electric systems with mechanical simplicity and ruggedness of pneumatic actuators. CONOFLOW CORP. *(more new products on page 30)*

Now Leslie brings you this New NO MAINTENANCE* Reducing Valve



You can just put this amazingly simple and compact Leslie Class GPK-A pressure reducing valve on the line and forget it for at least 3 years!

HERE IS AN AMAZINGLY SIMPLE air loaded, diaphragm operated, pressure reducing valve that is virtually maintenance-free for steam heat or process steam application.

Only two moving parts and no seals, no stuffing boxes, no small dirt-catching parts — practically nothing can get out of order! And a stainless steel hardened main valve with highly polished finish minimizes wear.

This new Leslie valve instantly feels the effect of any flow change and responds to changes as small as 0.1 psi. It can be adjusted easily from minimum to maximum of reduced pressure range from a remote point, even a thousand or more feet away.

This valve is used in steam process and heating lines. And, its uses are unlimited for any steam reductions within body material limits (250 psi, 450°F).

Ask your Leslie engineer to tell you more about this amazing valve. He's listed in your classified directory under "Valves" or "Regulators".

***guaranteed no maintenance for 3 years.**

Send for Bulletin 561 today.

TRADE LESLIE MARK

REGULATORS AND CONTROLLERS

LESLIE CO., 263 GRANT AVENUE, LYNDHURST, NEW JERSEY

Circle 133 on READ-N-CIRCLE card for more data

You get EXACTLY
what you set —
No More — No Less!

When you use NIAGARA
Displacement Meters for process control

Consistent accuracy in liquid measurements is obtained with Niagara Electricontact Meters. Set the gauge for the number of gallons required and accuracy goes into action. The set number of gallons will be exactly measured through the meter and the flow stopped by the closing of a solenoid valve.

Niagara Meters are of the accurate, positive displacement type. Each Niagara Meter is guaranteed to be individually tested and calibrated at the factory to run within close tolerances at all rates of flow within its rated capacity.

Learn all the facts . . . Mail the coupon for complete information.

BUFFALO METER CO.
2933 Main Street
BUFFALO 14, N. Y.

Please send me complete information on the use of Niagara Electricontact Meters for liquid formulations.

Liquid used.....
Flow G.P.M.....°F.....
Name.....
Company.....
Address.....

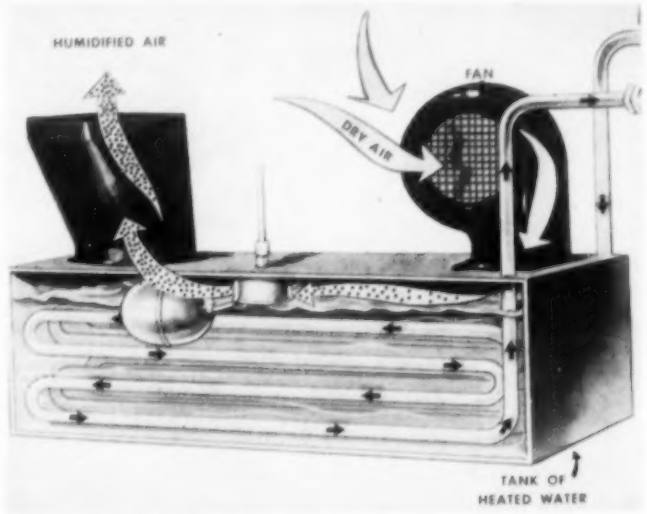
Circle 100 on READ-N-CIRCLE card for more data

new products

. . . starts on page 26

710-Humidifier is fully automatic

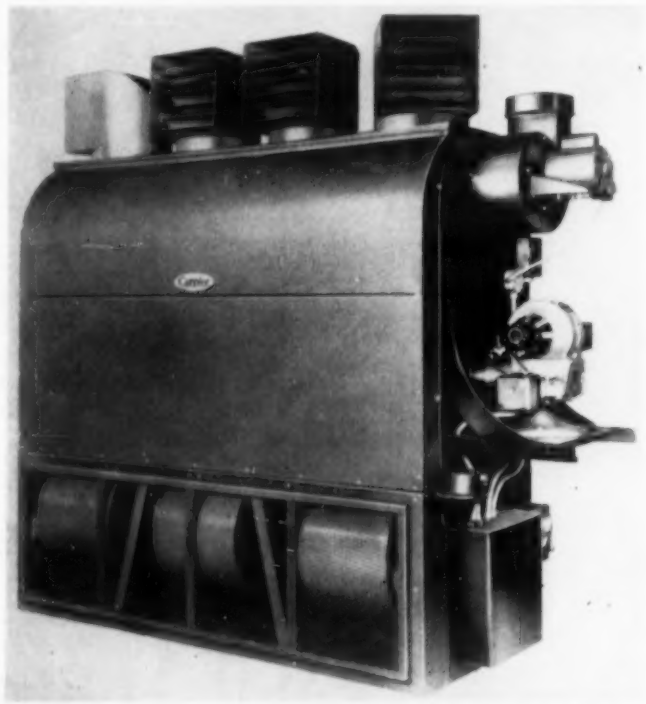
Fully automatic, evaporative-type humidifier can handle building spaces up to 33,000 cu ft. Blower circulates



air across heated water surface and into central distribution duct. Humidistat controls both blower and hot water pump. Can be suspended from ceiling or mounted on floor stand. ARMSTRONG MACHINE WORKS.

711-Direct-fired heaters are compact

Merely connect this unit to fuel lines and electric power source, secure in place, and it is ready for operation. Direct-fired heat diffuser is available in 10 sizes,



burns either gas or oil and delivers from 300,000 to 2,000,000 Btu. Installations range from wall or ceiling suspensions to floor mountings. Eliminates piping from central steam or hot water source. CARRIER CORP.

ACCURATE TEMPERATURE CONTROL of Hydraulic Liquids PREVENTS LOSSES

● This NIAGARA AERO HEAT EXCHANGER cools the liquid for a large hydraulic press, preventing heat damage to the pump stuffing boxes. Using outdoor air as the evaporative cooling medium, it removes the heat at the rate of input (1,875,000 BTU/hr.) with no cooling water consumption except a negligible amount evaporated.

Similar Niagara machines cool water, oils, solutions, lubricants and coolants for many mechanical, electrical and chemical processes. In a closed system, your coolant is never contaminated. The system is simple and easy to keep up; the equipment has a long, useful life.

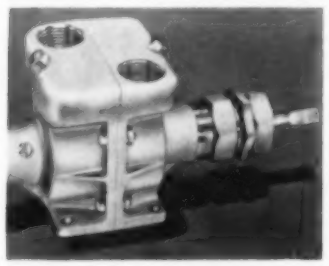
Write for Bulletin 120 for a complete description

NIAGARA BLOWER COMPANY
Dept. I. P., 405 Lexington Ave.
NEW YORK 17, N. Y.
District Engineers in Principal Cities of United States and Canada

Circle 122 on READ-N-CIRCLE card

712-Rotary pump handles hydrazine

Low-capacity, self-priming positive displacement stainless steel pump injects hydrazine in makeup water for boiler feed treatment. Chemically inert Teflon impellers and bearings are standard equipment. Stuffing box assemblies include plastic Teflon packing or fluid Teflon stuffing box seal, both designed to prevent air ingress into pump. Capacities are to 10 gpm and pressures to 75 psig. Higher pressures can be obtained by multistaging. Conventional types of mountings and electric motor, air motor, pulley, or chain drive can be used. ECO ENGINEERING COMPANY.

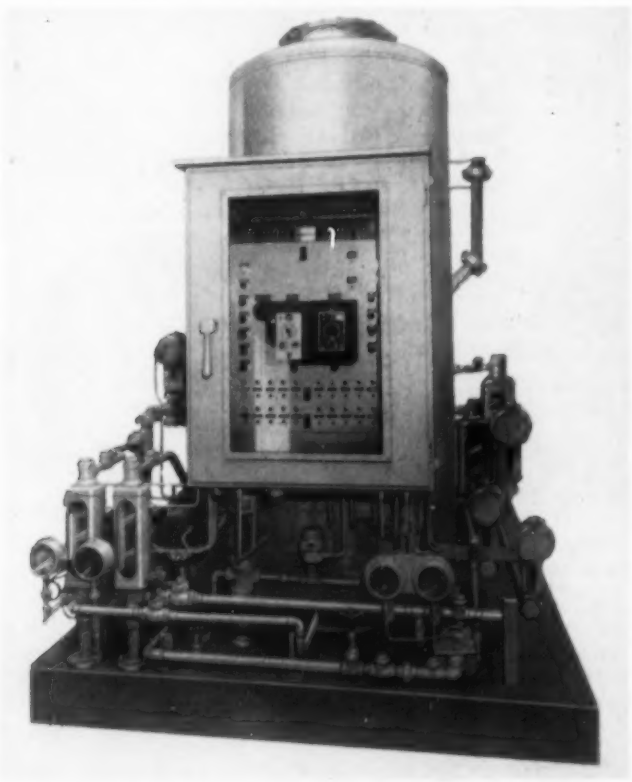


713-Matches water input to steam output

Balanced flow feedwater regulator matches feedwater input to steam output, regardless of load conditions. Control is modulated by three influences — drum water level, feedwater flow, and steam flow. Auto-manual control station permits remote manual control of feed valves. Transfer from manual to automatic control and vice versa is fast and without surge. Can be equipped with diaphragm- or piston-operated control valves. COPES-VULCAN DIVISION, BLAW-KNOX CO.

714-Package ion exchangers ready for use

Package mixed-bed ionXchanger is shipped completely assembled, with all gravels and resins in place, ready for immediate operation. Automatic operation is provided by motor-operated valves, and by program timer to govern regeneration at proper intervals. Assembled unit is fully tested at factory before crating and shipping. ILLINOIS WATER TREATMENT CO. ♦♦



SINCE 1888 ALCO Has Said: "Steam Supply by B&W"

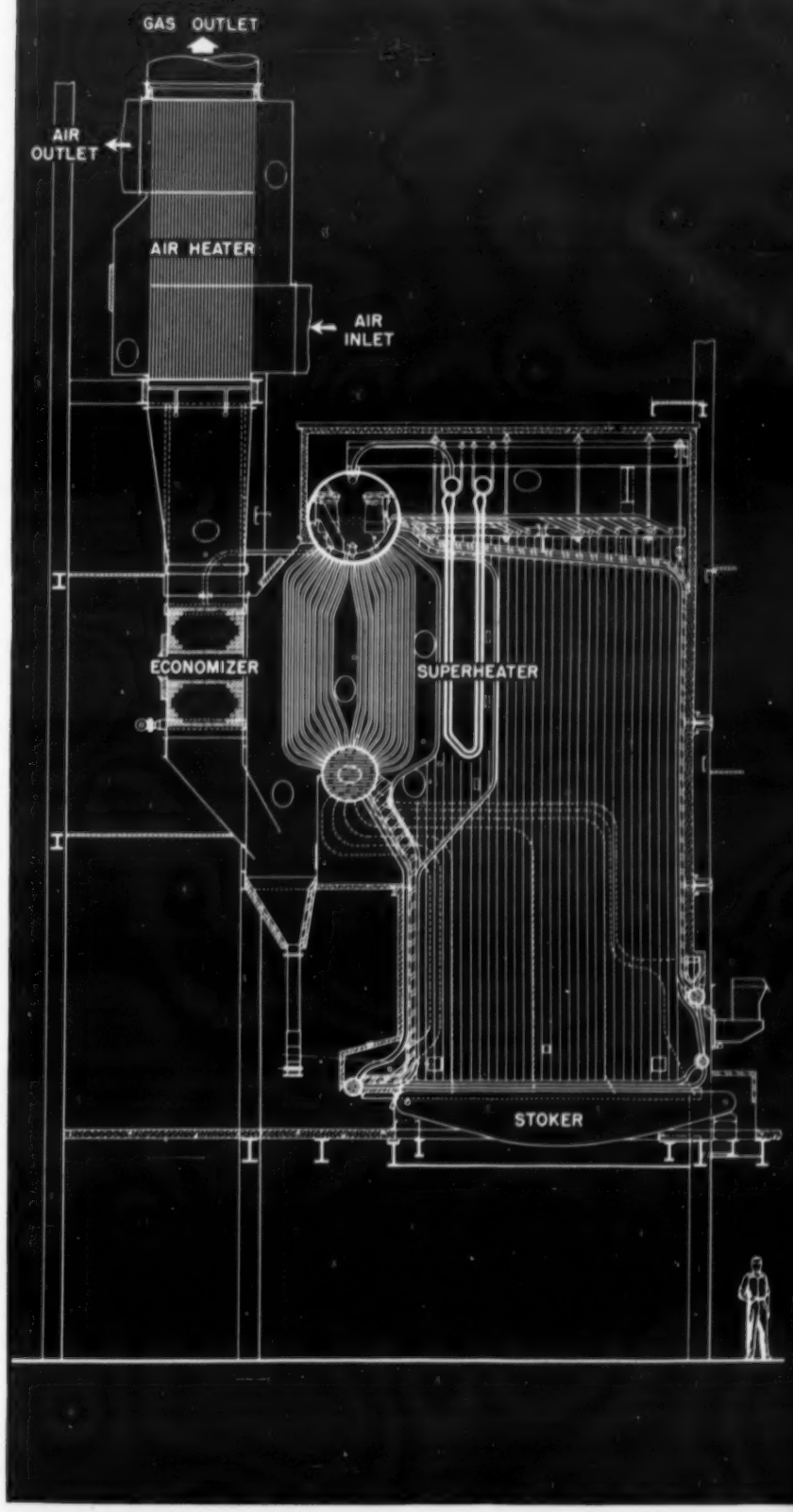
Back in 1888, when the *American Type* locomotive was setting speed records on passenger runs, B&W sold its first boiler to Schenectady Locomotive Works, predecessor of ALCO Products, Inc., to serve the plant.

In January 1955, two more B&W Two-Drum Stirling Boilers went on the line at the company's Schenectady plant. They are providing 100,000 lb of steam per hour for heating, for driving plant auxiliaries, and for some power generation. They bring the number to 40 B&W boilers in ALCO and its predecessors' plants.

What's Interesting about these two latest B&W boilers at ALCO is that they have operated at higher efficiencies than the design contract specified. To ALCO, with its long experience with B&W boilers, this was no surprise.

Long Range, Sustained economy—the product of the top level engineering design found in every B&W boiler—has become something to be expected by long time B&W customers.

More and more manufacturers, in the widest variety of lines, have learned, over the years, to depend upon B&W for an efficient, dependable source of steam. Whatever your steam needs may be—for heating, processing, or power generation—B&W engineers are ready to give you counsel, with nearly a century of steam generation experience behind them. The Babcock & Wilcox Company, Boiler Division, Dept. IP· 161 East 42nd St., New York 17, N. Y.



BABCOCK & WILCOX

BOILER DIVISION

G-771

basic bulletins

. . . just circle key numbers on READ-N-CIRCLE card on pages 47 or 48

AIR CONDITIONING, HEATING, VENTILATING

500-Pocket-size unit heater handbook

Engineering specifications, operating characteristics, installation and application data make Bulletin 9417 handy source of unit heater information. Data include capacity tables, dimensions, external ductwork suggestions, mounting heights, piping diagrams, pipe sizes, sound ratings, and wiring diagrams. Sixty-four pages. AMERICAN BLOWER CORP.

BOILERS AND BOILER ACCESSORIES

501-Boiler ratings in Btu/hr to steam

All manufacturers' organizations boiler code ratings in Bulletin DB-44-56 are reduced to common relationship of Btu/hr delivered to steam. Bulletin also gives useful tables and charts on flue gas volume for oil, gas, and coal. Selection, use, performance data on induced draft fans given. Twenty pages. DE BOTHEZAT FANS DIV., AMERICAN MACHINE AND METALS, INC.

502-Scotch boilers and stoker know-how

How 94 years' experience in boiler manufacture pays off in better construction is described in Bulletin 236. Gives complete data and test results. Sizes from 6 hp to 250 hp. Twenty-eight pages. THE JAMES LEFFEL & CO.

503-Blowoff heat is free heat

Recover practically all of the heat of the blowoff water in a continuous blowoff system. Bulletin 5700 uses diagrams and text to explain how this steam may be used to heat feedwater in an open or deaerating heater and how it may be condensed in a closed heater or flash condenser to heat feedwater at a point beyond the deaerating heater. COCHRANE CORP.

504-Boiler setting and baffle data

More than 30 boiler-setting plans are shown, with an analysis of how each arrangement of tubes is baffled to meet the specific boiler design, in 20-page Bulletin BW-54. THE ENGINEER CO.

CORROSION CONTROL

505-How to select protective coatings

Results of two-years' research on rust prevention in areas of severe rust-producing conditions are given in Bulletin 256. Includes information on all types of protective coatings. Gives tips on selecting specific coatings for most metals. Thirty-two pages. RUST-OLEUM CORP.

DRAFTING METHODS, EQUIPMENT

506-Better drafting with tapes

How to get better visual impressions from flow charts, graphs, and office and plant layouts is described in Bulletin 4C-50 3-56. Explains how pressure-sensitive tapes and templates minimize drafting time and retain better visual interpretation. Commonly recognized lines, shapes, bars, and symbols are preprinted on tapes with adhesive backing. Completed charts and layouts may be reproduced by any standard method. Twenty pages. CHART-PAK, INC.

ELECTRIC DISTRIBUTION

507-Dry transformer developments

"Latest Developments in Dry-Type Transformers," seven-page Catalog 153-A, presents the advantages of air-cooled units designed and constructed primarily for inside installations. SORGEL ELECTRIC CO.

508-Correct that low power factor

Booklet 50B, describes unit-cell box type capacitors which offer easy-to-install, economical means of correcting low power factor for large or small power consumers. Twenty-seven pages. SPRAGUE ELECTRIC CO.

509-Air interrupter switches data

Bulletin 152 describes 3E line of air interrupter switches. Includes engineering and installation data for complete line. Schematic drawings give control mechanism details. Eighteen pages. ELECTRICAL ENGINEERS EQUIPMENT CO.

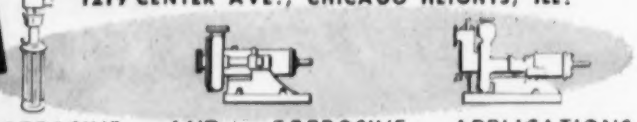
it takes a good pump to keep a good friend!

Nagle® Pumps are good pumps and have many good friends in industry. Typical is Behr-Manning Corp. Division of Norton Co. Abrasives is their business. Four Nagle abrasion-resistant pumps are in service at their plant shown above. The first, installed in 1946 in their boiler house, handles clinker laden water—a severe service.

NAGLE PUMPS are built for abusive applications only—abrasion, corrosion, heat, heavily loaded liquids, trash. Complete range of sizes—horizontal and vertical shaft types. Users re-order again and again on basis of performance. **SEND FOR CATALOG 5206.**

NAGLE PUMPS

NAGLE PUMPS, INC.
1219 CENTER AVE., CHICAGO HEIGHTS, ILL.



PUMPS FOR ABRASIVE AND CORROSIVE APPLICATIONS

Circle 131 on READ-N-CIRCLE card for more data

BASIC BULLETINS SUBJECT INDEX

Air conditioning, heating, ventilating 32
Boilers and boiler accessories ..32
Corrosion control 32
Drafting methods, equipment ..32
Electric distribution 32
Electric utilization 33
Fuels and firing equipment 33
Heat exchangers 33
Instruments and controls 34
Lighting 34
Maintenance items 34
Materials handling (bulk) 34
Mechanical power transmission 35
Nuclear 35
Pumping equipment 35
Valves and regulators 35
Water supply and treatment 35

NEW! USG SUPERGAUGE®

with exclusive USG ARC-LOC MOVEMENT

- With proper application this new Supergauge will last a lifetime!
- Legend on dial gives complete description of gauge construction. Maintenance engineer can pick proper gauge from his stock.
- Nylon-faced stainless steel segment with stainless steel pinion and stainless bushed bearings give lifetime service!
- *For your convenience* MONO-UNIT CONSTRUCTION Permits easy removal of complete gauge assembly for inspection and adjustment.

ARC-LOC MOVEMENT Provides complete and rapid adjustment from rear without removal of dial.

MICROMETER ADJUSTABLE SELF-LOCKING POINTER

Above features are also available in USG Solfrunt Gauges with solid front construction.

USG UNITED STATES GAUGE
Division of American Machine and Metals, Inc.
Sellersville, Pa.

Home of the SUPERGAUGE

Circle 138 on READ-N-CIRCLE card for more data

510-How to choose circuit breakers

Essential information on selection and application of molded case and large air circuit breakers is presented in this Speedfax catalog. Application sections use charts and tables to explain selection of circuit breakers for motor circuits, bus duct, conductors, and transformer secondary applications. Includes latest prices. Sixty pages. I-T-E Circuit Breaker Co.

ELECTRIC UTILIZATION

511-Heat with electricity 101 ways

Industrial electric heating applications and methods are described in 32-page Booklet, "101 Ways to Apply Electric Heat." Illustrated case histories show experience-tested ways to apply metal-sheathed Chromalox electric heating units in industrial jobs. Edwin L. Wiegand Co.

512-Motor controls manual

Manual GEA-6372 explains functions of motor control and types available. Describes manual, magnetic, and reduced-voltage starters; pushbuttons; relays; limit switches; solenoids; pressure and vacuum, float, plugging, and antiplugging switches. Thirty-two pages. General Electric Co.

513-Combination motor starter guide

High-voltage combination starters for 2300- and 4800-volt squirrel-cage, wound-rotor, and synchronous motors give extra overload and short-circuit protection. Bulletin 2-850 describes new type FPA combination starters. Twelve pages. Federal Pacific Electric Co.

514-How to select ac motors

Bulletin B-2103-1 gives selection data for motors in frame sizes from 182 to 6085. Includes speed-frequency relationship, NEMA design classes, torque characteristics, NEMA current and torque valves, frame selection tables, and dimension charts. Twelve pages. Reliance Electric and Engineering Co.

515-Synchronous induction motor data

Synduction motors offer synchronous speed with induction-motor simplicity, in sizes to 40 hp. Available in drip-proof, splash-proof, totally enclosed, and explosion-proof designs. Bulletin 51B8440A lists many uses of this custom-built motor. Four pages. Allis-Chalmers Manufacturing Co.

FUELS AND FIRING EQUIPMENT

516-Read about fuel oil additives

How to get complete protection from fuel tanks to burner tips is described in Bulletin 5012-A. Additives eliminate desludging operations, keep screens and burners clean, improve atomization and combustion, eliminate smoke and soot, and reduce rusting, pitting, and leaks. Includes recommended amounts of additive per 1000 gallons of fuel oil to simplify purchasing. Four pages. Dearborn Chemical Co.

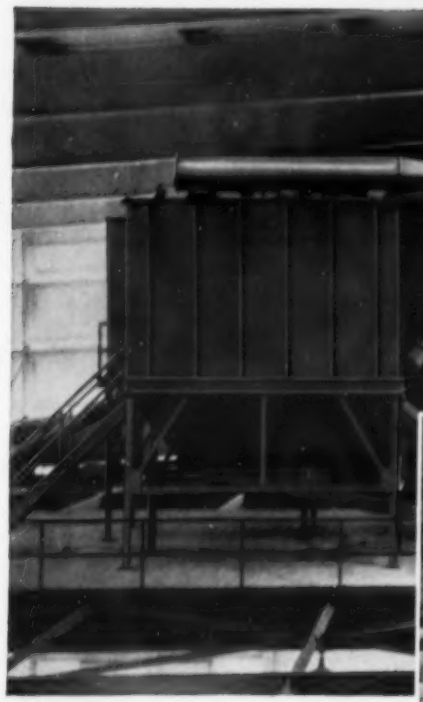
HEAT EXCHANGERS

517-Heat exchanger operation

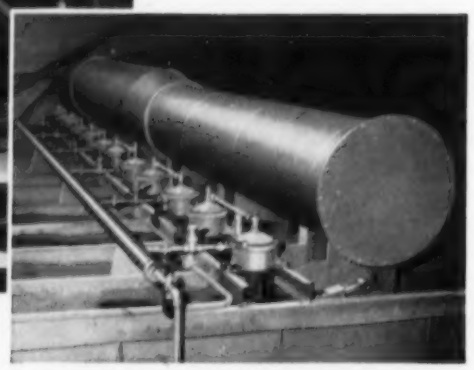
Air-flow diagram in two-page Data Sheet 124 graphically shows operation of the Aero Heat Exchanger for

Your Greatest Insurance Against LOSS
MOGUL
THE SOLUTION FOR EVERY WATER TREATMENT PROBLEM...GUARANTEED RESULTS...BACKED BY A BOND
Mutual OF OMAHA
Companion Companies
United OF OMAHA
HOME OFFICE · OMAHA NEBRASKA
November 21, 1955
The North American Mogul Products Co.
Standard Building
Cleveland, Ohio
Re: Home Office Building
United Benefit Life Insurance Co.
Mutual Benefit Health & Accident Association
Gentlemen:
We have three 178 H.P. low pressure boilers that are used for heating our Home Office Building and our Cafeteria Building, a total floor space of 392,939 square feet.
We are using MOGUL M-16 in our boilers, with good results. The boilers and tubes are clean enough that we have not had to use the third boiler even in the coldest weather. We also use MOGUL MP-31 in our air conditioning system and our 1025 ton cooling towers with the best of results.
To insure optimum conditions and efficient operation, the equipment must be clean inside as well as outside.
Mogul is doing a nice job taking care of our equipment and we, in turn, are keeping our 2,861 employees comfortable and happy on the job.
Sincerely,
Charles Gier
Charles Gier
Superintendent of Mechanical Engineering
CG/bjs
Mutual of Omaha — "the World's largest, exclusive Health and Accident Company"
725 Ton Centrifugal Refrigeration Unit.
MOGUL
Completely integrated water treatment service covering fact finding surveys, periodic inspection consulting service, water analyses and recommended water treatment for any equipment in your plant
Send Coupon Today
S-IN
Our Scale Problem is:
Firm Name
Address
Town
State
By
Title
The North American
MOGUL
Products Company
Standard Building
CLEVELAND 13, OHIO
"40 YEARS OF PROGRESS . . . AND STILL GROWING"
Circle 124 on READ-N-CIRCLE card for more data

Norblo gives you continuous peak-load Dust Collection



through automatic bag cleaning



Plants running full blast can ill-afford down time for equipment repairs and maintenance. Dust collection around the clock without interruption is commonplace with Norblo Automatic Bag Type Arresters.

Complete time-cycles for progressive automatic bag shaking are controlled by highly efficient electric timers. Only one compartment is cut out at a time, and that for just a few seconds, with *no* drop in efficiency for the installation as a whole. Norblo's compartment construction is the time-saving solution to inspection, maintenance and repair in busy plants . . . For "good housekeeping" or for salvage, Norblo Automatic installations have many design advantages wherever continuous high recovery of industrial dusts and fumes is important.

It pays you to write at once for latest information on Norblo Automatic Bag Type Dust Arrester that assures constant high efficiency dust handling.

THE NORTHERN BLOWER COMPANY

6422 Barberton Ave., Cleveland 2, Ohio OLympic 1-1300

Norblo ENGINEERED DUST COLLECTION SYSTEMS FOR ALL INDUSTRIES

Circle 147 on READ-N-CIRCLE card for more data

basic bulletins

. . . starts on page 32

water, oil, or compressed air cooling. How the unit saves cooling water, piping, pumping, and equipment costs is explained. NIAGARA BLOWER CO.

INSTRUMENTS AND CONTROLS

518-All-purpose meters for liquid measurement

Principles of operation of nutating-piston-type meters are explained in Bulletin 37. Contains illustrations and data of typical installations, trap strainers, air release valves, high-pressure meters, and meter registers for the measurement of most fluids. Twenty pages. BUFFALO METER CO.

LIGHTING

520-Industrial fluorescent lighting data

Bulletin B gives data on 394 Benjamin industrial fluorescent lighting units. Describes lighting systems for general work-area lighting, for critical seeing tasks, for damp and humid atmospheres, and for hazardous locations. Easy-to-follow data tabulation speeds up lamp and accessory selection. Thirty-six pages. BENJAMIN ELECTRIC MFG. CO.

MAINTENANCE ITEMS

521-Handbook on specialty steels

Distinctive characteristics of a broad range of special purpose steels in terms of end use are given in this comprehensive handbook. It briefly summarizes tool and die steels, stainless steels, silicon and high-nickel electrical alloys, special purpose alloy steels, valve, heat-resisting and super-alloy steels, tubing and pipe, and fine wire. Will help to match the proper steel to the job. Thirty-two pages. THE CARPENTER STEEL CO.

522-Welding procedure data chart

Welding procedures and recommendations for arc welding various tubing steels are contained in data chart TDC-155A. In addition to indicating proper electrodes, it provides information about preheating and postwelding heat treatments. A valuable condensed chart for all who weld stainless and alloy steels in tubing and other forms. THE BABCOCK & WILCOX CO.

523-Rubber gloves give extra safety

Catalog describes Charco method of electrical testing of sleeves and gloves. Charco natural rubber gloves are tested at voltages to 50,000 ac and 100,000 dc. Catalog gives tips on selection, maintenance, and inspection of complete line of gloves and sleeves. Thirty-two pages. CHARLESTON RUBBER CO.

MATERIALS HANDLING (BULK)

524-How to store bulk materials

Storage bins for bulk materials such as ashes, coal, coke, sand or lime are discussed in this bulletin. Contains tables of densities of flowable materials, capacities,

For clean, accurate, dependable heat CONVERT TO **CHROMALOX ELECTRIC IMMERSION HEATERS**

CHECK THESE 5 BIG FEATURES

- Portable, screw-plug, flanged types; full range of sizes and ratings
- "Packaged" units—heating element and thermostat in one
- Copper, steel, alloy or lead sheath
- Explosion and moisture-resistant terminal boxes available
- Most sizes ready NOW for immediate shipment

For these applications:

Heating water, oils, Dowtherm, Prestone, tars, greases • Plating, cleaning and pickling solutions • Heating tanks, drums, process kettles • Melting greases, asphalt, other viscous fluids • Super-heating steam, compressed air • Melting lead, solder, babbitt and stereotype metal.

FREE CATALOG

Write today for Catalog 50. Full details including prices for Chromalox Electric Immersion Heaters and other units that provide the electrical answer to many more heating problems.

C-2102A

Edwin L. Wiegand Company

7520 Thomas Boulevard
Pittsburgh 8, Pa.

Circle 112 on READ-N-CIRCLE card

description of wall construction, test data, and other relevant engineering data with many photographs. Thirty pages. THE NEFF & FRY CO.

MECHANICAL POWER TRANSMISSION

526-Poly-V belt drive characteristics

Design characteristics of the Poly-V drive, a single, endless belt with molded lengthwise ribs, are explained in eight-page Folder 6638. Line drawings and text compare the Poly-V with conventional drives and point out advantages. MANHATTAN-RUBBER DIV., RAYBESTOS-MANHATTAN.

NUCLEAR

527-Nuclear reactor terminology

New booklet banishes fog surrounding nuclear reactor terminology. Gives thumbnail profiles of common reactor types. Tells in nontechnical language essential reactor features. Eight pages. MINNEAPOLIS-HONEYWELL REGULATOR CO.

PUMPING EQUIPMENT

528-How to figure pump heads

How to determine total head against which pump must operate is only one of the valuable sections in Bulletin 353-1000 on the Bilton pump, a general purpose pump suitable for medium and low head service. Twelve pages. BYRON JACKSON PUMPS, INC.

VALVES AND REGULATORS

553-Control valve reference book

Three basic types of single-seated diaphragm control valves are discussed in 16-page Bulletin 5304. Cutaway views and charts with complete specification data make this a good reference book. LESLIE CO.

WATER SUPPLY AND TREATMENT

554-Clean boilers give better operation

Complete water treating service from initial survey to operating report forms is discussed in this bulletin. Describes treatment that stops scale, corrosion, foaming, and carryover by using correct treating compounds. Describes portable water test kit for field use. Gives quick, accurate test of water samples without knowledge of chemistry or involved calculations. Four pages. NORTH AMERICAN MOGUL PRODUCTS CO. ♦ ♦

Have you read . . .

what R. A. Budenholzer, Director of the American Power Conference, has to say about today's engineers and the role they are playing in the power industry's growth? Read Forum . . .

see page 3.

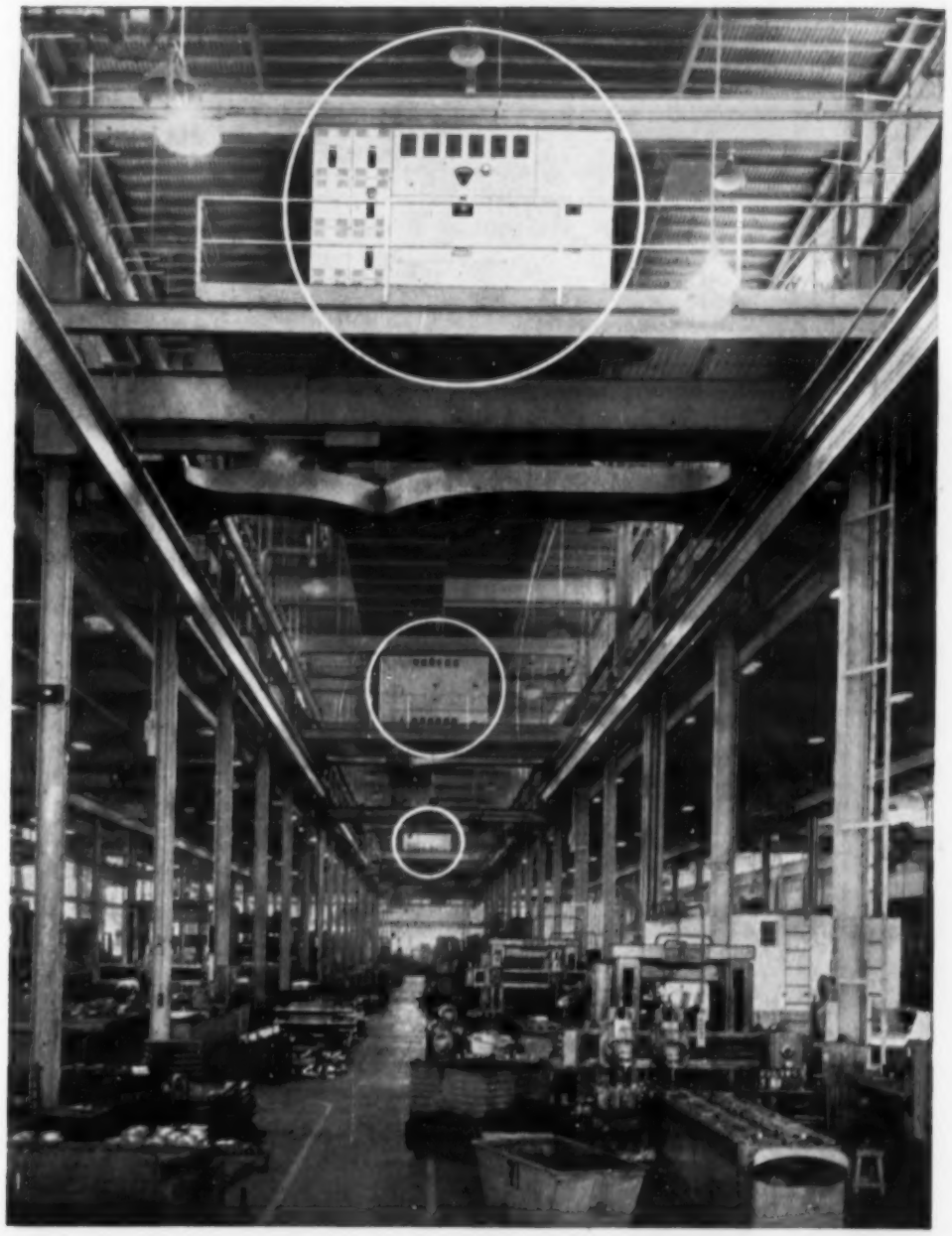
This is how

THE GOSS PRINTING PRESS CO., Chicago obtains

efficient distribution

of electric power with high voltage feeders to load centers, and also

saves floor space



This was accomplished with

SORGEL Dry-Type Transformers,

compactly incorporated into substations, all self-contained, safely enclosed in steel, complete with primary switchgear and secondary circuit breakers, and installed above floor level.

This installation consists of five 500 Kva and two 300 Kva, 3-phase, 4160 volt to 480 volt substations for power, and 13 dry-type transformers, sizes 10 to 50 Kva, 3-phase, 480 volt to 120/208 volt for lighting and portable equipment.

This installation saved The Goss Printing Press Co. thousands of dollars over a low voltage distribution system, and provided them with the efficiency that only a high voltage distribution can provide.

Again the ingenuity of an owner, his architects, and consulting engineers, combined with SORGEL expert engineering, resulted in a most modern, flexible, space-saving and efficient electric distribution system.

By using SORGEL dry-type substations, all vaults have been eliminated, and by installing the substations overhead, more floor area was made available for manufacturing facilities.

Architects — Olsen & Urbain
Engineers — Neiler, Rich & Bladen
Electrical Contractor—The Edward Electric Co.

Sales Engineers in Principal Cities

SORGEL ELECTRIC CO., 841 West National Ave., Milwaukee 4, Wis.

40 years' experience in the development, manufacturing and application of transformers

Circle 104 on READ-N-CIRCLE card for more data

Firing fluid coke

. . . starts on page 12

takes out any moisture. The refinery oil fired is No. 6 fuel oil, preheated to 180 F with Braun steam heaters and recirculated to one of the two 1,182,000-gallon storage tanks. These oil storage tanks are above ground, surrounded with earth work dikes and insulated with monobloc and galvanized steel sheeting.

superheaters hang free

Each boiler has a two-section pendant-type superheater with desuperheating between the sections. Superheaters are suspended outside and hang freely inside the furnaces.

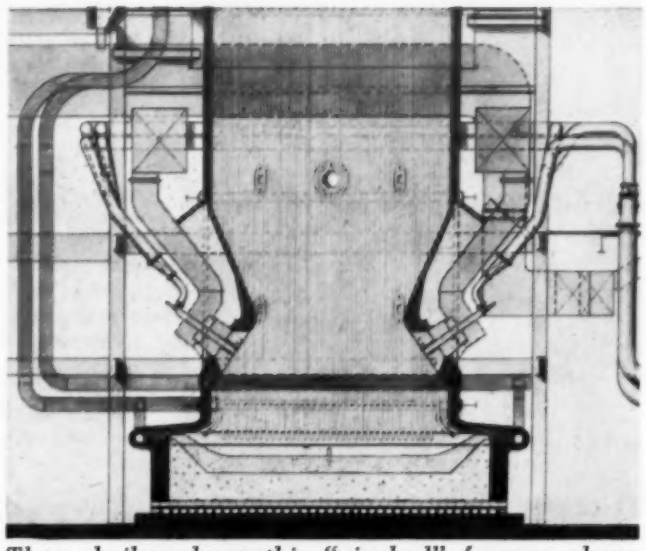
A desuperheating water valve on each superheater sprays into the loop between two of the headers to control superheat temperature at 950 F.

Boilers are supported in the center (about lower drum height) and expand both upwards and downwards. They have an inner steel "skin" case on the inside, 3½ inches of monobloc insulation in two layers, then a steel outer shell. Inner skin helps to protect the insulation. Outside steel panels are secured with batten straps and painted to prevent corrosion.

Slag is drawn off through a slag notch that is closed with a clay plug, just like a blast furnace. As the slag flows out, it is hit by water jets and quenched. After quenching again, it falls into a sump and is removed by hydro jets to the slag-collecting basin. Water is decanted off and slag is removed by a clam-shell bucket-type crane. It is expected that this slag will have to be tapped off once every 4 to 6 months.

slag bottom improves combustion

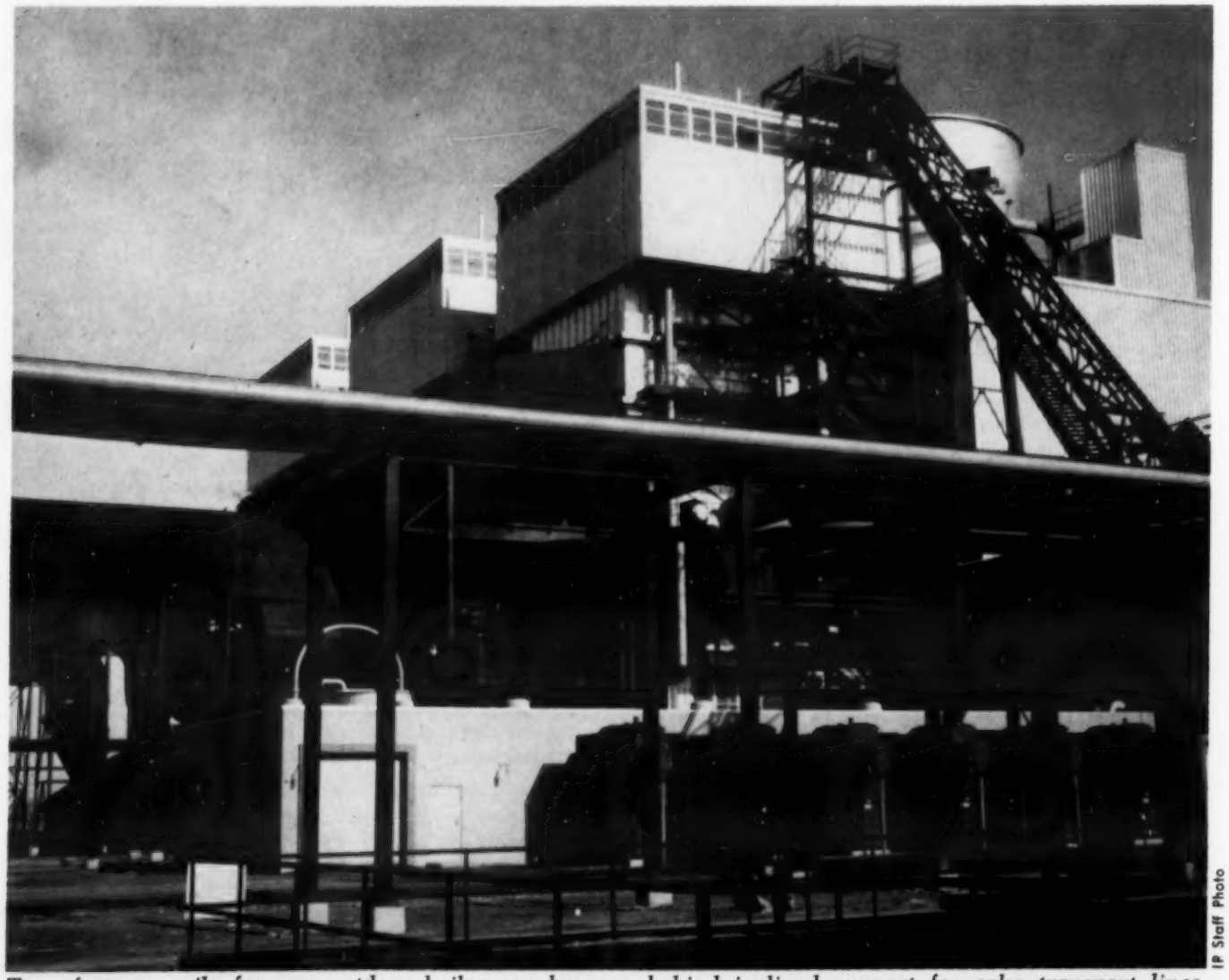
Idea behind the slag bottom is to obtain higher temperatures and turbulence to get more complete combustion. General heat release over the whole furnace is about 17,000 to 19,500 Btu/cu ft/hr, but in the combustion zone itself the heat release is 84,000 to 96,000 Btu/cu ft/hr.



Three boilers have this "pinched" furnace shape to permit inclined firing and give better combustion.

The furnace is completely water cooled, with the lower portion of the tubes (from the hearth to about 15 feet above the burner level) coated with chrome-ore. The hearth itself is air cooled and has free-standing fire brick walls. The hearth bottom is cooled by forced air passing through built-in ducts that exhaust to atmosphere on the opposite side of the furnace. Above the hearth floor, tapered fill of high-silica sand with a fusion temperature of 2850 to 3000 F has been poured (4 feet thick at the sides and 2½ feet thick at the center). There are 24 thermocouples under each hearth to measure hearth temperatures, with instrument and selector on an auxiliary board alongside the boiler.

Dolomite will be blown into each furnace just



IP Staff Photo

Top of storage silo for one outdoor boiler can be seen behind inclined support for coke transport lines.

IP Staff Photo

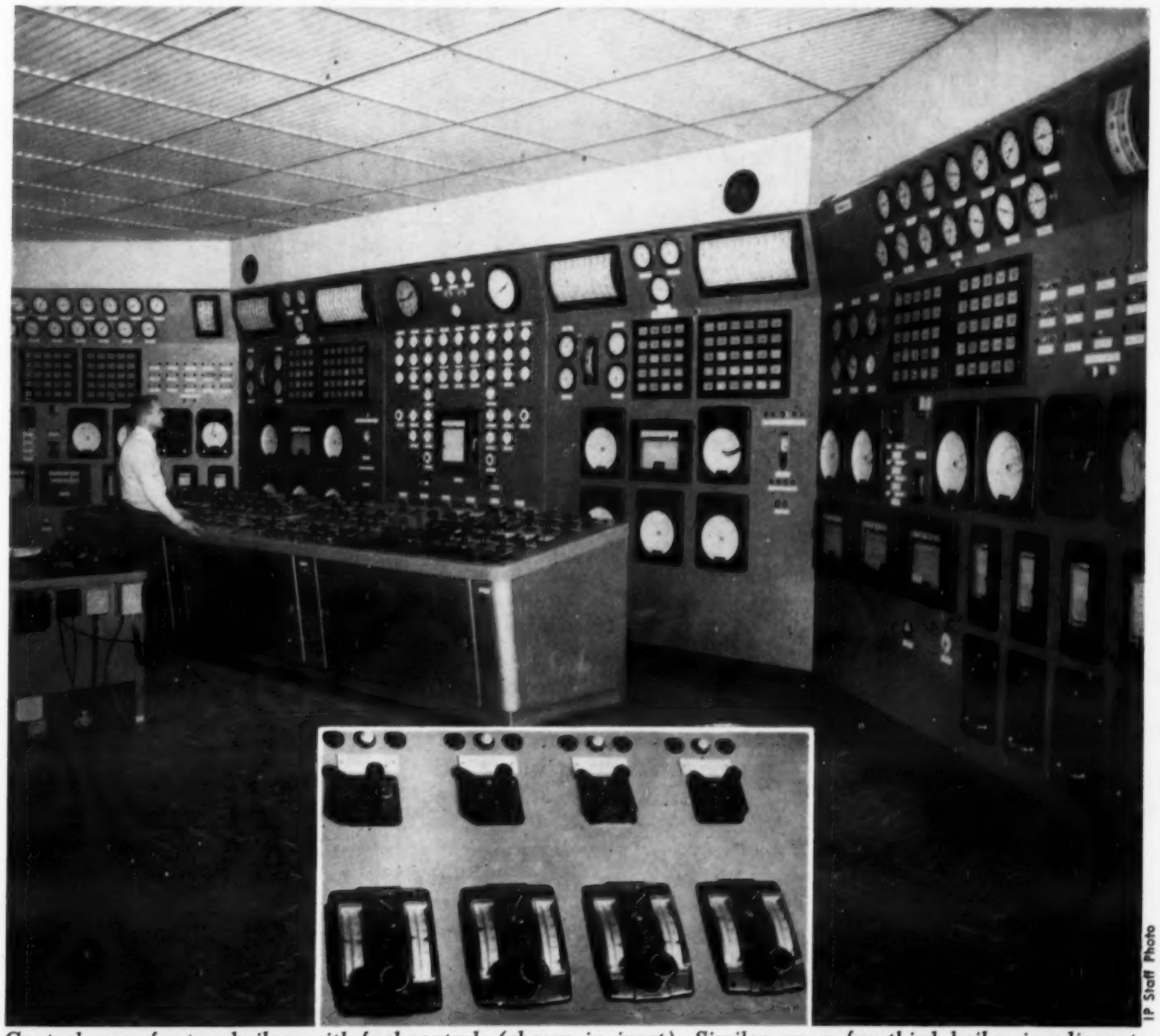
Each coke storage silo feeds three continuous-type scales, coke feeders, and pulverizers for each boiler.

above the combustion zone through three nozzles in the west furnace wall to help protect tubes. System consists of a bin feeding into a rotary screw feeder driven at variable speed. This will govern the dolomite loading per cubic foot of transport air. Air for conveying dolomite is supplied by a positive displacement blower. Amount of dolomite to be used will be determined by fuel analysis.

Each boiler has one vertical Ljungstrom air heater with "Corten Steel" baskets to resist corrosion. These air heaters are blown every shift. Each boiler has one FD and one ID Westinghouse Sturtevant fan. Each boiler has two Yarway bicolor remote level indicating sight glasses, a Bailey water level recorder, and Yarway level indicator in the control room. Each boiler has a Prat-Daniel cyclone-type mechanical dust collector. All collected material is continuously recycled back to the pulverizers through a recirculation fan. This material may contain a large percentage of carbon. Space has been provided for another precipitator (probably mechanical, if needed) between ID fan and stack.

stack is extra high

All three boilers exhaust to a common stack that has capacity for a fourth future boiler of the same size. Stack is 500 feet high with an inside diameter of 32 feet at the base, and 20 feet at the top. It is lined with acid-proof brick throughout its length and has a hopper bottom below the breeching entrance. Breeching has been painted with a lime-base paint, applied by spraying, to help slow down corrosion, but life expectancy has not yet been determined. Stack was built by Custodis Construction Co., Inc., of New York City to withstand 100-mph hurricane winds. In fact, all elevated structures were designed for hurricane-force winds. *(continues on page 38)*



Control room for two boilers with fuel controls (shown in inset). Similar room for third boiler is adjacent.

IP Staff Photo

Ever looked in your reference file for specific information when you needed it—and found a void. Or perhaps you found *some* material, but not the right kind. We *all* have. Well, here's a chance to be sure you have a *lot* of information on one subject, at least—heat processing.

This new 20-page MOCO "Fact Book" is crammed full of basic heat processing information you'll refer to time-and-again. Its prepared by MOCO Engineers—men who specialize in *only* industrial ovens. Write for your copy today (on your letterhead please). We'll send it along immediately.

MICHIGAN OVEN COMPANY

Manufacturers of Industrial Ovens
For Every Plastic Application
411 Brainard, Detroit 1, Michigan

1-1

Circle 125 on READ-N-CIRCLE card for more data

KIRK & BLUM

DUST CONTROL SYSTEM

saves power through automatic orifice selection

Top portion of each chute serves as dust control inlet orifice. Dust is removed **before** it can reach batch area.

Each individual dust collection port is designed to be automatically opened by monorail batch car when it stops at particular silo. Closes automatically when car leaves.

COMPANY: The Chas. Taylor Sons, Co., Cincinnati, O., a Subsidiary of National Lead Co., manufacturers of special refractories.

PROBLEM: Dust collecting system for batch mixing area containing 7 silos of refractory grain which feed by chute into monorail batch car as it passes down line.

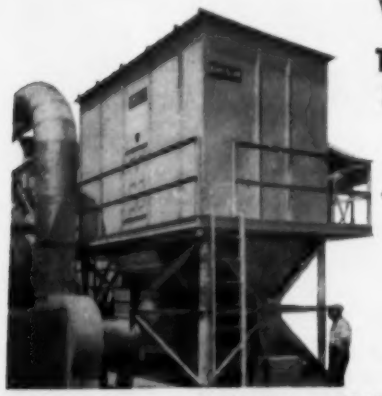
SOLUTION: Kirk & Blum system assures just the right balance to remove light dust without stealing usable product.

Ingenious damper arrangement conserves air, assures highest system efficiency. **No silo dust collection port is open except when its chute is operating.**

Let Kirk & Blum — with 50 years experience — solve your intricate dust collection problems.

Write today for detailed information.

THE KIRK & BLUM MFG. CO.
3174 Forrer St., Cincinnati 9, Ohio



10,000 C.F.M. dust arrestor located outside saves space. Collected dust moves to central disposal point by screw conveyor.

Circle 153 on READ-N-CIRCLE card for more data

All three boilers discharge steam to a common 14-inch header system at 1300 psig and 950 F. Automatic extraction to the refinery is at 600 psig and 750 F.

Two General Electric extraction-condensing turbogenerators are rated 25,000 kw at 3600 rpm. Each is designed for a maximum throttle flow of 750,000 lb/hr steam at 1250 psig and 950 F. Turbogenerators tie-in with Delaware Power & Light Company's system through a 69-kv transmission line. Station's entire output is for the refinery. A Leeds & Northrup tie-line controller maintains zero interchange between the station and the utility system except in emergencies.

Station has its own transformer bank to supply auxiliary loads which amount to about 20%. The auxiliary load is high because the fluid coke pulverizers use more power than coal pulverizers and because process steam supply to the refinery boosts makeup to about 40%.

IP Staff Photo

Top of fluid coke storage silo with inlet line. Silos have 60-degree conical bottoms and could store coal.

A fully centralized control room, totally enclosed and air conditioned, has a luminous ceiling that gives 60 footcandles all over the room. All controlling is done from benchboards by two operators.

Station has 73 employees altogether, with 9 men per shift on actual boiler and water treatment plant supervision.

Operation of a modern oil refinery demands complete reliability of power and process steam supplies. This is not a fancy station with a lot of gadgets. Instead, it has been carefully designed and engineered to take maximum advantage of a new fuel and to provide the greatest degree of service reliability consistent with flexibility, provision for future growth, and operating economy. ♦♦

How Good COMMUTATOR MAINTENANCE Saves Money

IT'S JUST LIKE CHANGING THE OIL IN YOUR CAR...

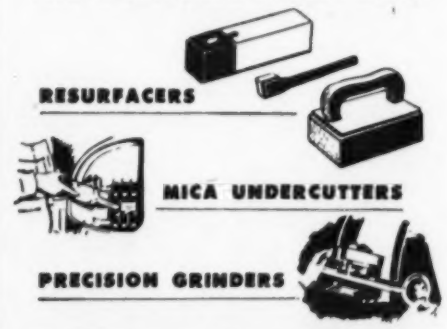
You do this regularly because it makes your car run better and last longer. The trifling expense protects you against loss.

It's the same with motors and generators. Periodic maintenance of commutators and slip rings is simply low-cost insurance against high-cost replacement, rebuilding and motor failure.

Keep Your Motors Running Longer at Lower Cost with

IDEAL PREVENTIVE MAINTENANCE

THE COMPLETE IDEAL LINE:



RESURFACERS

MICA UNDERCUTTERS

PRECISION GRINDERS

FLEXIBLE ABRASIVE STICKS

Ideal Preventive Maintenance gives you everything you need to set up a preventive maintenance program that will save you many times its small cost. NO DISMANTLING OR TAKING EQUIPMENT OUT OF SERVICE WHEN IT'S NEEDED.

NO SPECIAL TRAINING!

Your present employees can do the job. Our simple FREE HANDBOOK tells them how, why and when. Mail the coupon for Handbook and Catalog Data.

IDEAL Products Are Sold through Leading Distributors . . . In Canada: Irving Smith, Montreal

IDEAL INDUSTRIES, Inc.
1023-C Park Avenue, Sycamore, Ill.

Send Catalog Data on:

☐ Resurfacers ☐ Mica Undercutters
☐ Precision Grinders ☐ Flexible Abrasive
☐ Send Free Handbook

Name.....
Title.....
Address.....
City.....Zone...State.....

Circle 108 on READ-N-CIRCLE card

Best in lighting

. . . starts on page 14

LADWP engineers judged that visibility could best be evaluated and specified by the concept of *relative visibility*.

Relative visibility is a single, numerical value expressed in percentage calculated from measurable factors. Five basic phenomena influence and determine relative visibility: task brightness, light intensity, glare, specular reflections, and shadows.

Based on this concept of relative visibility, the following high standards have been adopted for LADWP control rooms: Relative visibility: 85% minimum, with the following limitations imposed on components:

- High task brightness: 40 footlamberts minimum for any seeing task.
- High average light intensity: 70 footcandles minimum in the horizontal plane, with not more than 25% variation throughout the room and not less than 50% of the horizontal intensity at any point on a vertical surface.
- Absence of glare and Brightness Ratio: No visible light source brighter than 10 times the darkest surface in the room and no seeing task brighter than 3 times its background.
- Elimination of specular reflections: No reflected image in the room with intensity greater than 125% of the average brightness of the reflecting surface.
- Absence of shadows: No shadow that reduces light intensity more than 10% on any visual task.

Psychological comfort is gained. With our high standard of relative visibility for control rooms and the attendant rigid limits on brightness ratios, photometric brightness contrasts disappear. We have evidence that lack of visual contrast creates a psychological monotony that induces lethargy in personnel. Since a high degree of operator alertness is required, this effect must be avoided.

use color for contrast

Problem of maintaining stimulating visual contrasts without brightness contrast is solved by using color. We apply the psychophysics of color to assure psychological comfort for our control room operators. Color contrast is substituted for brightness contrast.

To minimize photometric contrast while creating color contrast, highly saturated, high-reflectance colors with nongloss finish are used throughout control rooms. Color hue and pattern are varied on walls, floors, furniture, and equipment to provide a natural environment.

This planned application of color is used in all our luminous ceiling control rooms. Operating personnel voice enthusiastic approval.

Several lighting methods had been used in our older control rooms. Best of these was a false skylight system supplemented with cove lights. We considered none, however, satisfactory.

We obtained data for a number of lighting methods. Performance, with respect to our requirements for good control-room lighting, were compared Wall-to-wall, solid luminous ceiling was the only method that met all our requirements. As a result of our comparisons, luminous ceilings were selected for control-room lighting.

we meet problems

When luminous ceilings were first considered for lighting our control rooms, two major problems appeared:

- A procedure had to be developed for designing illumination characteristics. No recognized method was available for accurately designing lighting values for these ceilings. We solved this problem by developing our own design procedure for luminous ceiling lighting.

Full-scale mockup was constructed. Control and meter panels and other control-room furnishings were placed in the mockup. Numerous diffuser materials, light sources, suspension methods, and combinations of ceiling elements were tested and checked. This allowed theoretical considerations and practical results to be tested while our design was being developed.

- Physical features had to be designed for a luminous ceiling system that would have correct photometric characteristics for high relative visibility in control rooms, and that yet would be efficient and economical. Manufactured luminous ceiling systems were appearing on the market. We investigated them. But those available at that time would not satisfy all our requirements.

Author, J. N. Robertson, shows how removing luminous-ceiling panel provides access for maintenance.

what are features of this design?

Our luminous ceiling is a system of three interrelated functional elements — a plenum cavity, a light source, and a diffuser. Plenum cavity contains lamps. Cavity surfaces serve as the light reflector. Fluorescent lamps are used as the normal light source. Incandescent lamps located in the cavity provide emergency lighting. Diffuser is made up of acrylic plastic sheets resting freely in a supporting framework.

Principal physical features of the ceiling are:

- Standardized design
- Flexibility
- Long service life
- Easy maintenance
- High efficiency
- Correct photometric characteristics, and
- Competitive cost

Standardized design eliminates custom designing each control room. Only details need be varied to fit an individual room. Commercially available materials are used throughout. All items are types that can be quickly installed by a crew of electricians working with regular tools.

Slimline fluorescent lamps operating at 425 ma are mounted in continuous rows in the plenum cavity. Fluorescent units are one-tube strip-light type. These are purchased in pairs of end-to-end units, each pair with a single two-tube ballast. These units are supported either by steel rods or by gripper clamps, depending on the physical nature of the structure. Circuit wiring is carried to lamp rows by one transverse run of steel raceway nippled to each lamp channel row as it passes across.

Supporting framework for the diffuser is suspended from the overhead structure by threaded steel rods, each having a small turnbuckle for quick adjustment. Framework has 2-foot by 4-foot openings, and is assembled from prepunched aluminum tee bars fastened with prepunched clips. Frame periphery is attached to the room walls by small studs set with a stud gun.

Plastic diffuser panels are purchased in 2-foot by 4-foot sheets, ⅛-inch thick. These sheets drop into place in the framework.

Flexibility can be accomplished for any size or shape room and for any predetermined light intensity without changing our basic design. This exceptional flexibility is possible by having the diffuser framework suspended independently of all lamps and electric work.

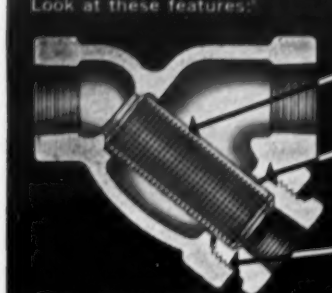
Diffuser framework is assembled without regard for lamp placement. By starting assembly at the room center lines, panel sizes are not altered except

(continues on page 40)

NEED STRAINERS?

Take a look at this one!

Armstrong Y-type pipe strainers look much like other strainers on the outside, but the INSIDE is what counts! Look at these features:



Corrosion-resistant stainless steel screens are standard.

Locked in stainless-asbestos gasket cannot blow out.

Straight bushing threads ease bushing removal.

8 sizes (¼" to 2") in semi-steel for pressures to 250 psig. 6 sizes (½" to 2") in cast moly steel for pressures to 900 lbs. Screens made of 430 stainless steel either perforated (.045" dia. holes, 226 per sq. in.) or 24 x 110 mesh wire cloth.

NEW BULLETIN No. 802 tells all—send for your free copy today!

ARMSTRONG MACHINE WORKS

8205 Maple Street • Three Rivers, Michigan

Satisfaction Guaranteed!

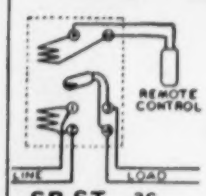
ARMSTRONG Y-TYPE PIPE STRAINERS

Circle 144 on READ-N-CIRCLE card for more data

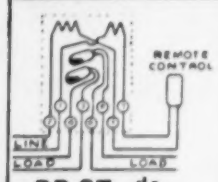
MERCOID®

MERCURY SWITCH RELAYS FOR VOLTAGES TO 440 ac or dc

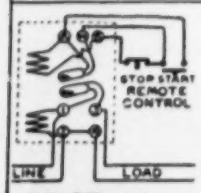
NO SPRINGS OR CLAPPERS
NO WELDING OF CONTACTS



SP-ST ac



DP-ST dc



SP-ST ac start-stop

The operation of a Mercoid Transformer-Relay has several advantages over clapper type relays. In principle, it is a low voltage transformer—the two coils of which, operate as a repulsion relay.

The primary coil is fixed in position and connected across the high voltage line. The secondary coil is movable and is connected to the control circuit.

When the control circuit is closed, the secondary coil instantly moves upward by repulsion action, thereby operating the hermetically sealed mercury contact. When the control circuit opens, the secondary coil drops by gravity restoring the mercury contact to its original position.

Hundreds of circuit arrangements are available—a few typical examples are shown

WRITE FOR BULLETIN NO. 31

THE MERCOID CORPORATION

4201 Belmont Ave., Chicago 41, Ill.

Circle 136 on READ-N-CIRCLE card for more data

at the ends or sides of odd-dimensioned rooms. Here, end or side panels may be smaller. Smaller diffuser panels are easily cut from standard plastic sheets with a table saw. Since smaller panel sizes can occur only at the edges, symmetry is achieved.

Because lamp suspension is independent, lamps can be placed on any spacing to meet footcandle requirements of individual rooms.

Long service life is expected . . . . 25 years minimum for each luminous ceiling installed. Only long-lived materials are used. We chose acrylic as the diffusing plastic because of its inherently stable, long-life characteristics.

Easy maintenance is inherent and cost is low. Ceilings are serviced from below from step ladders or portable platforms. Every 12 to 15 months the plastic panels are lifted out and washed. All lamps are replaced in one operation. We plan to spray cavity surfaces with a fresh coat of paint once every five years.

High efficiency is gained. System lumen output efficiency is very high, above 80% in all installations to date. This is higher than the efficiency of most individual lighting fixtures. This high efficiency is gained by two means: treatment of the cavity and use of nonabsorbing diffuser material.

Cavity receives special attention to prevent light absorption. Unnecessary objects are kept out of the cavity space. Ventilation ducts and similar items that must be in the cavity are carefully placed to avoid creating light entrapment spaces. All cavity surfaces are spray-painted with three coats of casein-base paint having above 90% reflectance.

To minimize light absorption by the diffuser, a non-pigmented, translucent, white acrylic plastic is used as the diffusing material. Desired translucency in the plastic is obtained by an emulsification process instead of by pigments. Light absorption is not greater than 2% at the end of one year's service, and does not further increase with age.

Correct photometric characteristics needed in a luminaire to satisfy control room high relative visibility requirements are: high light output with low surface brightness, uniform brightness for all directions of view, and a high percentage of light diffusion.

Luminous ceilings improves lighting from 18 to 85 footcandles in modernization of 30-year old control room.

High light output with low unit brightness is obtained by making the ceiling as wide-area as possible — a full, wall-to-wall.

Uniform brightness in all directions is accomplished by lamp placement, diffuser translucency, and diffuser pattern. Distance between lamps is never greater than twice the lamp height above the diffuser. For proper translucency, plastic with incident transmittance limits of 47 to 54% is used. To provide a more uniform surface viewing angle from all directions, a dimpled-pattern diffuser plastic is used. This pattern has continuously curving surfaces and no flat-plane areas.

Competitive cost is favorable. With luminous ceilings, we save about 40% of the cost of false skylight systems formerly used. Luminous ceiling costs compare favorably with those of other popular control-room lighting methods. This is possible because no special structural features are required, system is simple, and installation costs are low.

Luminous ceilings are a functional part of the control-room air-conditioning and ventilating systems. In some of our stations, air enters the control room through wall louvers and exhausts from the ceiling light plenum. In other control rooms, air flow is reversed . . . . entering through the plenum and exhausting through the lower side walls. Conventional ceiling air louvers are not used in either case. Air flows upward or downward past the edges of each plastic light diffuser panel giving equal air flow distribution over the entire room. This is proving very satisfactory.

Proper lighting is growing in importance as power plant control centers become more extensive in scope and come under the control of fewer and fewer operators. Control rooms are a plant's nerve center. Operation depends on accurate performance of diversified seeing tasks.

is good lighting worth its cost?

Good visibility costs less than operating mistakes. Ideal control-room illumination is being provided for a maximum total cost of $5.00 per sq ft at today's prices. Making allowance for a finished structural ceiling with other types of lighting, this is about $1.75 per sq ft higher than the *cheapest* lighting method for the *same* number of footcandles. For a 2000-sq ft control room, this is a cost difference of $3500. But one operating mistake can cost many times that amount. An incidental value of good control-room lighting we do not overlook is its contribution to personnel comfort and morale.

Future luminous ceilings will be further improved for performance, efficiency, and cost. Because each functional element in our design is independent, any one of them can be improved without altering the others. Advantage will be taken of better light sources, circuitry, and materials as they become available. ♦ ♦

New engineering era

. . . starts on page 3

the aid of modern computing machines) with a degree of speed and accuracy that would have been undreamed of before World War II. For this contribution, we can be grateful to our engineering schools. They have in the past, and still are, performing an inestimable service in educating students of superior quality.

The second factor is the free exchange of information between educators, engineers, scientists, and executives. The American Power Conference, with which I am associated, is but one endeavor to provide a forum for exchange of information. In my own experience in this organization, I have had the unusual opportunity to observe a gradual but steady shift in emphasis from ultra-conservatism to aggressive leadership.

Not too long ago, we found it difficult to obtain forward-looking papers for the American Power Conference. Engineers thought it would be better to wait until their new unit was in service and thoroughly tested before talking about it. With this attitude, progress was slow. Today the reverse is true. Emphasis is placed on what is now being built, or what is being planned for the future. Almost everyone is anxious to be among the leaders in the industry and to contribute his own experiences toward overall progress. This is just one manifestation of the maturing our power business is experiencing . . . . and which underlies all past and future progress. ♦ ♦

American Power Conference

March 27, 28 and 29, 1957
Sherman Hotel, Chicago

Among the technically newsworthy papers to be presented at the Conference are the following:

Operating Experiences With Twin Furnace Boilers; E. M. Powell, Combustion Engineering, Inc.

Distribution Transformer Loading From Customer's kwh Consumption; Hugh Lawyer, Oklahoma Gas and Electric Co.

Pipeline Transportation of Coal; Clarence A. Dauber, Cleveland Electric Illuminating Co.

Aluminum Condenser Tubes—Report on a Plant Installation; W. A. Pollack, Wisconsin Electric Power Co.

Significant Developments in Large Boiling-Water Reactor Plants; Raymond C. Freeman, General Electric Co.

for hard-tough-dense
• concrete repairs . . .

Non-Shrink EMBECO
PRE-MIXED MORTAR

Outlasts and outwears plain cement-sand patches because . . .

- *Does not shrink* upon hardening.
- Bonds tightly to old concrete and mortar.
- Tough iron particles serve as reinforcement.
- Density resists water and oil penetration.
- Higher compressive and impact-resistant strength.
- Hard — contains no asphalt.

EMBECO PRE-MIXED MORTAR IS READY TO USE —you add only water.

Used to patch cracks, disintegrated and worn concrete floors, walks, steps, walls, etc.

Write for 4 page folder illustrating many applications.

DIVISION OF AMERICAN-MARIETTA COMPANY
the MASTER BUILDERS co.
CLEVELAND 3, OHIO TORONTO 9, ONTARIO
Circle 132 on READ-N-CIRCLE card for more data

Always Available – Quickly!

RHOPAC Top Quality

Gaskets and Tapes. Making gaskets and tapes from top quality Asbestos Wire Inserted Cloth is a Rhopac specialty. Specify Rhopac boiler gaskets, folded tapes (plain or tadpole), and retort door packing. Prompt service — low prices.

Sheet Gasket Materials. All standard gasket materials in various thicknesses kept in stock at all times — available in sheet or roll form. Your order will receive immediate attention.

Rhopac Packing Hooks. A packing extractor whose flexible shaft greatly simplifies the removing of old, worn-out packing. In set of 3 handy sizes — other sizes available. A great time and labor saver.

Mechanical Packings. We stock a wide selection of high temperature, high pressure and all standard types of packing. Special requirements are also developed and produced on short notice.

See Rhopac on All Gasket and Packing Problems

Exceptional Service —Top Quality

Rhopac, Inc.
3409 Cleveland Street, Skokie, Illinois

Manufacturers of mechanical packings, industrial and boiler gaskets, steel rule dies, flexible packing hooks

Circle 103 on READ-N-CIRCLE card for more data

REPUBLIC
Quality Valves
FOR
TEST STANDS

10,000 psi Needle Valves
5,000 psi Super Duty Globe Valves
5,000 psi Super Duty Needle Valves
Micrometer Adjustment Needle Valves
Pressure Snubbers
Adjustable Gage Protectors
Plug Valves
No Lubricant "Teflon" Plug Valves
6,000 psi Lo-Torq Selector Valves
pressure balanced for easy turning

Distributors in principal cities coast to coast

RM REPUBLIC MANUFACTURING CO.
15655 BROOKPARK ROAD • CLEVELAND 11, OHIO

Circle 146 on READ-N-CIRCLE card for more data

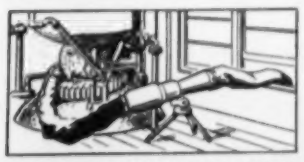
Ventilate CONFINED Places with Vano Design "C" Ventilator-Exhauster

Ideal for withdrawing welding fumes from confined places or directly from the welding rod. Provides greater safety, greater comfort for workers . . . leads to greater work efficiency. Can be furnished with 8" suction inlet to which 8" non-collapsible suction tubing may be attached . . . or provided with multiple inlet nozzles for 5", 4" and 3" suction hose.

Other types are also available for supplying fresh air to men working in confined places, such as tanks, manholes, drums, boilers and shipholds.

For full details on Coppus Vano Design "C" Ventilator-Exhauster write COPPUS ENGINEERING CORPORATION, 183 Park Ave., Worcester 2, Mass.

WELDING FUMES are here removed by this Vano Ventilator-Exhauster.



FUMES FROM A REACTOR KETTLE are here withdrawn by tripod-mounted Vano Ventilator-Exhauster. Note non-collapsible suction tubing and discharge tubing.

ANOTHER COPPUS "BLUE RIBBON" PRODUCT

Circle 113 on READ-N-CIRCLE card for more data

Nine guideposts

. . . starts on page 16

supplied by a single transmission line.

While more and more lines are being installed underground, the most common approach is still overhead. Overhead lines are subject to external hazards—the destructive forces of nature and moving objects. Susceptibility of overhead lines can be reduced by best location, construction, maintenance.

Many interruptions of overhead power supply lines are caused by their proximity to hazardous buildings or process equipment. Fires and explosions affecting transmission lines have caused extensive production loss in industrial plants located blocks, and even miles, away. In very congested areas, underground lines may be the answer.

fire destroys fire-fighting power

Several years ago, a large plant in Philadelphia—fully equipped with fire protection equipment—was completely destroyed because its utility supply line ran adjacent to the outside wall of the plant. This line was completely severed by an explosion occurring within the plant. Fire protection system was useless since its water supply depended on an electric fire pump. Physical loss ran into millions. But more than that, production stopped for almost a year. Your plant's location may endanger utility's line carrying power to save your own plant.

9) How reliable is your own distribution system? Industrial plants grow in size. With this growth there has been a tremendous increase in power demand. A few years ago, one transformer bank may have been sufficient to meet the demand. Today, two, three, four, and even more are frequently required. Electric equipment grows older. In many instances, service life has been overextended to meet the increased demand. Today, several transformer banks may be tied together giving a more flexible power supply. This parallel supply increases available short circuit current on switchgear. Not only is switchgear becoming overloaded, but the experience of switchgear manufacturers shows that some switchgear is actually capable of handling only a portion of its original rating. This results in a general derating in allowable capacity. Old switchgear, even though serving within its rated capacity, actually may be overloaded as a result.

It would be nice if all plants could discard their old switchgear and put in new. This is impractical. Several practical methods exist to correct overload and trouble conditions without replacing old switchgear. Busses can be divided. Reactance can be inserted. Adding switchgear to overcome overloads is an obvious cure. Ring busses in industrial power distribution systems generally improve efficiency and reliability. A common problem affecting power supply continuity involves location and installation of feeders. In a large steel mill in Ohio, a fire starting in the insulation of one cable spread to a large group of neighboring cables. This group of cables provided primary supply over a long bridge to the plant. Result of this fire was disastrous. Though physical loss was not extensive, loss due to months of production stoppage was staggering.

Lightning causes numerous breakdowns. Though it has not received as much publicity, however, switching surges probably cause equally as many breakdowns as lightning. In the case of lightning, the physical loss and business interruption loss is collectable from insurance companies if such coverage is carried. In the case of switching surges, it is not. As electric systems and rotating equipment become older, they become more susceptible to surge damage and resulting breakdown. Careful analysis by experienced engineers can determine where surge capacitors should be installed on a secondary bus and where lightning arrestors should be installed on primary feeders.

Chief electrical engineers in industry must be extreme pessimists to anticipate the many conditions that can develop to interrupt supply to vital production and to develop effective plans for minimizing their effects. Such plans would determine what emergency standby equipment and materials must be stockpiled. Plans would outline step-by-step measures to be taken for each anticipated condition. A major factor in preventing damage to electric distribution systems involves eliminating or

CASE 1

Electric power is supplied by overhead high-voltage feeder from Utility's substation one mile distant. Seven transformers reduce voltage from 13,800 to 440 and 240/120 volts for plant use. Utility distribution lines are protected against lightning with overhead shield or grounded conductor.

Severe electrical storm occurred the previous night. Shortly after starting operations the following day, one 167-kva, single-phase transformer burst into flames. Burning oil from the ruptured transformer enveloped the entire transformer farm, destroying all seven. Entire loss can be attributed directly to lightning entering the plant through the Utility's wiring.

CASE 2

A 40-year old 2300-volt synchronous motor was known to be in hazardous condition, and a replacement had been ordered. Plant electrician had noticed that the exciter commutator was sparking, and tried to relieve the trouble by holding a rag against it. This action decreased an already reduced exciting current, and the overheated oil circuit breakers could not handle the overload surge.

Efforts to extinguish the fire with a hose line were to no avail, and in the excitement no fire alarm was transmitted. Valuable time was lost before the fire was noticed by other employees on an upper floor. Losses amounted to $2,800,000.

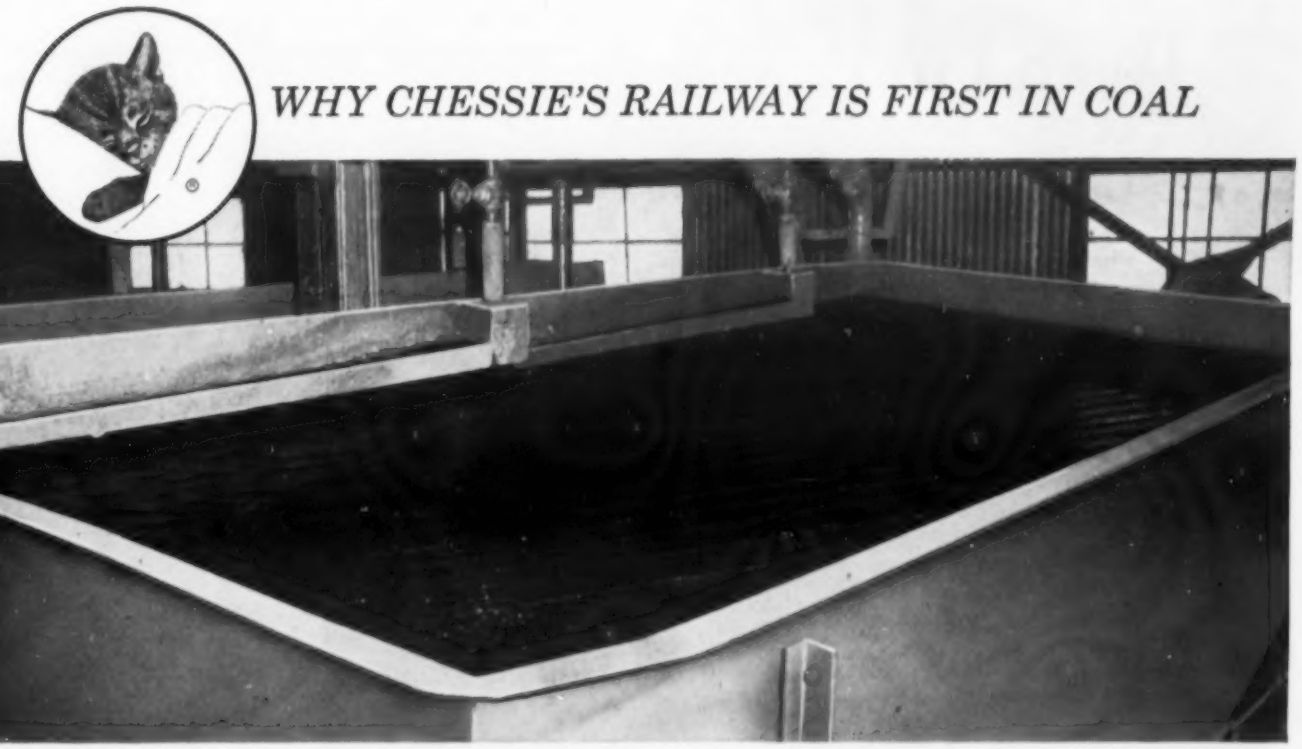
minimizing external exposure hazards. No fire or explosion hazards should be so located as to expose critical electric equipment and lines. Existing exposure hazards must be adequately protected.

Probably more large fire losses involving electric equipment have resulted from hazardous exposures than from any other single factor. Today, a transmission line may pass over an incombustible steel building which houses incombustible, nonhazardous processes and contents. Tomorrow, management may decide to alter production and to place a hazardous operation in this same building. Thus, a transmission line which is reliable today may become relatively unreliable tomorrow. This also applies to transformer banks, distribution centers and control panels.

fire survey expense can be shared

Reliability evaluation surveys covering the nine guideposts described require considerable time and some expense. A most practical approach is for several neighboring industrial companies, dependent upon the same supply, to join forces. They either can conduct a survey with their combined forces or employ the services of consulting engineers qualified in this evaluation field. Results of a cooperative program are vitally important in developing each plant's emergency program and in determining whether standby generating equipment should be purchased.

A company may enjoy five consecutive years with only a few small losses and may become overconfident in the adequacy of its fire protection program. Next year, the same company may have several disastrous losses that uncover glaring deficiencies in its fire protection program. Start with the nine guideposts now. ♦♦



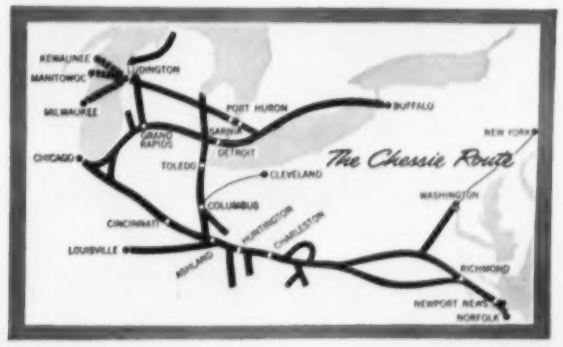
SUPERIOR COAL. This Deister Table for washing slack is an example of the up-to-date methods employed by producers on the C & O to give you the highest quality and performance in the type of coal best suited to your needs. Superior coal means lower ultimate cost.

SUPERIOR SERVICE. Chesapeake and Ohio operates the world's largest fleet of coal cars with ample power to move them. By its prompt repair program C&O keeps more than 99% of these cars in good order. And C&O's new car reporting system can give you the exact location of any car on C & O lines at any time.

For dependable deliveries of top quality coals, contact coal producers on the C & O. And if you need help in meeting your own particular fuel requirements, write to: R. C. Riedinger, General Coal Traffic Manager, Chesapeake and Ohio Railway Co., Terminal Tower, Cleveland 1, Ohio.

Chesapeake and Ohio Railway

WORLD'S LARGEST CARRIER OF BITUMINOUS COAL



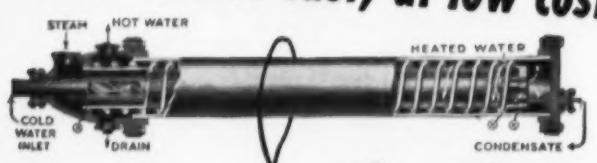
Circle 116 on READ-N-CIRCLE card for more data

Here is the quick new way to stop oil leaks instantly. Just rub OYLTITE-STIK into the leak and it's sealed. Doesn't become brittle; is not affected by heat or cold; withstands normal vibration. On every job, every service call, take OYLTITE-STIK along. See your jobber, or write us for full information.

LA-CO — LAKE CHEMICAL CO.
3090 W. Carroll Ave., Chicago 12, Ill.

Circle 149 on READ-N-CIRCLE card for more data

STEAMLINED!
to heat water fast, at low cost



In the Johnson Heater, water to be heated is routed first inside, then outside, a blanket of live steam. It's full pressure steam, too; up to 150 lbs., or 250 lbs. in heavy duty types, no reducers are needed. The result: faster, more efficient heat transfer for a unit of its size. No wonder industry has found so many applications for the Johnson "Instant" Heater, in heating water and process liquids of various types.

Sizes for all needs; write for literature

The Johnson Corporation
807 Wood St., Three Rivers, Mich.

Circle 128 on READ-N-CIRCLE card for more data

Check your scales

. . . starts on page 18

storage. These scales are built for the heavy service to which they will be subjected. If maintained in good condition, they will provide the power plant with almost indisputable proof of the weights received. With frequent inspection and testing, they soon will establish a reputation for dependability that will assure you that shippers are billing weights correctly.

moving to bunkers

Coal movement from ground storage to bunkers is the next step that calls for weight determination. This movement is normally by conveyor belt. Weighing operation can be done in a highly efficient manner by a totalizing conveyor scale. This means no extra coal handling by expensive equipment and labor, as the weighing is done while the coal is moving on the belt.

Great progress has been made in weighing in motion in recent years. Bulk coal weighing is one good example of what modern scales can do for large volume bulk materials handling. Careful attention should be given to design and installation of conveyor weighers at the outset—when the belt conveyor is being engineered and installed.

An integrating scale integrates the factors of weight, belt speed, and time interval to determine the net weight moving over the weighing element. It is self-operating and reflects the totalized weight of the coal handled.

fuel weighing controls efficiency

Coal weighing just prior to being fed to boilers is necessary for efficient power production. This requires scale accuracy and dependability to avoid fuel waste or inefficient power production. Just as the merchant can lose merchandise with an unreliable or obsolete scale, the power plant can give away its most costly ingredient, fuel. Any good method of weighing at this point—to get the most efficient operation under the circumstances—will be satisfactory.

In some situations, a traveling scale car may be used. An operator controls the car and weighs coal manually from an overhead bunker. Scale car supplies correct weights to stokers or pulverizer hoppers. Operator may keep a running record of weights delivered to various units. There are some disadvantages to this method:

- Dust is created (dust in working scale parts creates friction, demanding more careful maintenance for accuracy).
- Labor and time are required.
- Human error in recording weights of coal consumed is possible.

Numerous manually operated scales, however, have been doing a good job where this type of weighing is needed.

Trend in the larger and more efficient power generation plants is toward more automatic weighing for boiler feeding. There are many reasons for this trend:

- Dust is more easily controlled.
- More uniform distribution throughout the combustion chamber is obtained.
- More accurate accounting records are available.
- Adjustments for coal grades is easier.
- Labor costs are reduced.

In addition, control room adjustments, to increase or decrease power output, can be made with positive assurance.

Hour-to-hour data required to compute the water evaporated per pound of coal must come from accurate scale weights and from water meters. A sudden evaporation decline requires investigation to locate the cause, and adjustment to obtain the desired effect. Automatic scales have counters that totalize individual loads weighed and fed to boilers. Totalizers can be located at the scale and at the remote master control panel. Boiler efficiencies for the various units comprising the system thus can be computed.

Input scales do their weighing just ahead of the boiler. With multiple boilers, a control scale is required at each. For single boilers with multiple pulverizers or mills, there is a scale for each mill to assure uniform delivery from each source. Constant check is thereby possible on percentage of load carried by each pulverizer.

Labor saving is another area in which modern and accurate weighing is important. There is no such thing as cheap labor these days. Even unskilled labor is expensive. Modern automatic scale operations eliminate manual handling, with savings exceeding scale cost in a short period.

automatic scales save $32,400 per year

A recent case history describes automatic net weighing of 55-gallon oil drums at the rate of 1000 drums per eight-hour shift with a single attendant. Labor savings of $10,500 a year are obtained. Overfill losses of $85 a day are eliminated. Total calculated savings are $32,400 a year.

In addition to eliminating handling costs, automatic scale controls can eliminate the element of human error in most instances. Even with the most conscientious personnel, such errors are all too likely to enter any operation.

Consider how human error is eliminated in a typical automatic scale. Coal enters the scale from a bunker and passes onto a feed conveyor. This, in turn, conveys the coal to a counter-balanced weigh hopper suspended from a weigh beam. When the weigh hopper is loaded almost to the preset weight, it comes into balance. Microswitches, con-

tactors, and a solenoid are actuated by the loaded weigh hopper. They stop the belt feeder at balance and discharge the weigh hopper. Burning rate determines hourly weighing capacity. Coal head in the downspout holds the counter-weighed hopper door open until the column in the downspout drops and the door closes. The operating cycle then repeats itself automatically. No room for human error in this arrangement.

It is important to efficient plant operation that fuel used be correctly weighed for another reason—to avoid waste. Excess fuel burned may not result necessarily in corresponding additional power production. On the other hand, too little fuel may restrict power generation. Exact weighing, or as exact as practical considerations will permit, is the real answer to this situation. No matter what kind of scale you use, dependable weighing is of the utmost importance.

what causes scale mistakes?

The most common reasons for scale mistakes are abuse, use of worn-out or obsolete scales, and friction build-up. Modern scales are ruggedly built. They are precision instruments. Many scales, even huge coal-weighing machines, are built with high precision. This means that rough treatment, or repair or adjustment of scales by untrained personnel can cause sensitive parts to be misaligned.

Friction is another cause of weighing mistakes. Scale friction is caused simply by wear from continuous usage. When parts are new, they are keen and hard. They move easily against each other. With hundreds of thousands of weighings, parts become dull and build up resistance to movement. This usually means that more weight is on the platform than is indicated by the scale. In generating power, it may mean that you are burning more coal or other fuel than you think you are.

regular tests catch scale errors

Frequent regular tests are the only way you can tell whether your scales are correct. Tests are inexpensive and pay big dividends. Make sure your men are aware that scales are precision instruments, worthy of respectful treatment, and you will go a long way toward eliminating errors. Abusing scales or tinkering with them is one of the most common causes of trouble.

Common sense dictates that all coal used for power must be carefully weighed. Not only should the total weight of all coal consumed be recorded, but continuous analysis of individual boilers should be maintained by weighing the coal consumed by each. One final thought: In weighing coal or other fuels, you are literally weighing money. What you are doing is converting pounds into dollars and cents. It's money your company is weighing. Make sure you weigh it right. ♦♦

RIGHT,
in every case

CHAPMAN STEEL VALVES

Check them off, one by one. They're all important to you, a user of valves . . . steel valves. You want close tolerances; tight and positive seats; smooth, dependable, operation without jamming, chattering or excessive wear. Even with long service under the most severe conditions you want to cut your maintenance costs to a new rock bottom low.

Name your metal. You can have Chapman Steel Valves in standard alloys for normal requirements . . . or special alloys for extra service conditions. And for *your* benefit, all of these alloys are poured in Chapman's own foundries under rigid technical supervision.

Chapman superior steel valves — gates, globes, checks — are available for all pressure and temperature ranges. You can order them with bolted, welded or pressure seal body and bonnet joints and with flanged or welding ends. They all equal or exceed ASA and API standards in every range.

Why not write now for our complete descriptive catalog No. 20.

THE
CHAPMAN
VALVE MANUFACTURING CO.
INDIAN ORCHARD, MASS.

Circle 129 on READ-N-CIRCLE card for more data

Giant Wheel Excavator, developed by United Electric, can strip up to 3,000 tons of overburden per hour – almost twice as much as a conventional 40-yard shovel.

Better Service
Through Improved Production and Marketing

UNITED ELECTRIC DEVELOPS NEW MINING METHODS AND EQUIPMENT

High volume, low cost production at United Electric's 6 big mines means more coal . . . better prepared coal to meet the needs of midwest industries, utilities, railroads and the domestic market.

If you operate in the Great Lakes area, you'll be vitally interested in United Electric's system of All-Water transportation of coals.

We urge you to contact your nearest United Electric Sales Representative. He'll gladly give all the details on price and sizes and he'll prove to you that it's highly profitable to use a United Electric coal.

FIDELITY
domestic and industrial stoker coal

CUBA-BUCKHEART
precision prepared coals

RUBY
washed West Kentucky No. 11 for industrial and domestic use

BUFFALO CREEK
washed West Kentucky No. 6 industrial and domestic stoker coal

MARY MOORE
No. 7 Illinois for industrial and utility use

ruby

Unimite is United Electric's super-power explosive. Safe and easy to handle, Unimite is almost twice as powerful as ordinary powder – uncovers twice as much coal per hole.

New Rotary Overburden Drill designed and perfected by United Electric is self-propelled and uses compressed air to bring drill cuttings. Use of this unit has doubled the footage drilled per man hour.

THE UNITED ELECTRIC COAL COMPANIES

CHICAGO, *307 N. Michigan Ave., Phone CEntral 6-6580* • PEORIA, *Commercial National Bank Building, Phone 3-3711* • ST. LOUIS, *Ambassador Building, Phone GArfield 1-3732*

Circle 107 on READ-N-CIRCLE card for more data

names make news

. . . personalities from industry power

AIEE nominates **Walter J. Barrett** president. Barrett is transmission engineer for New Jersey Bell Telephone Co. He has been AIEE treasurer since 1953. **L. F. Hickernell,** chief engineer at Anaconda Wire & Cable Co., is nominated to succeed Barrett as treasurer.

J. G. White Engineering Corp. names **Dudley F. Phelps** president. **Stephen P. Darlington** succeeds Phelps as vice president in charge of engineering.

Federal Power Commission announces recent appointments: **Joseph H. Gutride** becomes secretary of FPC. He has been assistant secretary since 1942. **Edgar T. Hughes** is new chief of Division of Electric Resources and Requirements in the Bureau of Power. He was formerly chief of the Power Supply Section.

Playter

McBride

Buell Engineering Co., Inc. elects **Robert F. Playter** chairman of the board. **J. A. McBride** is new president and general manager. **Henry Dohrman** is new vice president in charge of engineering.

National Electrical Manufacturers Association awards 50-year certificate of recognition to **Louis W. Cole,** chairman of the board of Federal Pacific Electric Co.

National Association of Corrosion Engineers announces 1957 award winners. Recipient of Frank Newman Speller Award for achievement in corrosion engineering goes to **Walter F. Rogers,** chief chemist, Houston Production Division Chemical Laboratory, Gulf Oil Corp. Rogers is an organizer and a former president of NACE. Willis Rodney Whitney Award goes to **Carl Wagner,** professor of metallurgy at Massachusetts Institute of Technology, for his contributions to the understanding of physical chemistry.

U. S. Department of Health, Education and Welfare names **Fred C. Heinz** a chief advisor to the Surgeon General of the Public Health Service on the new Federal Water Pollution Control Program. Heinz is vice president of H. J. Heinz Co. ♦♦

Use A

Read-N-Circle

Card

For new products information, handbooks, bulletins, and details about advertised products . . . .

Read

and

Circle

the key numbers, on the adjoining cards, corresponding to the advertisements, new products, and literature items that interest you. Then

- *Fill in your name, title, address.*
- *Drop the READ-N-CIRCLE card in the mail. (No postage necessary.)*
- *INDUSTRY POWER's Reader Service Department will immediately forward your requests to the manufacturers. They will send you, directly, the information you request.*

Use this READ-N-CIRCLE Card for FREE information

Your name_____ Title_____

Company name_____

Company address_____

City_____ Zone_____ State_____

100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122
123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145
146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168
400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422
423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445
446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468
500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522
523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545
546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568
569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591
700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722
723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745

INDUSTRY POWER March 1957

FIRST CLASS
PERMIT No. 19
(Sec. 34.9, P.L.&R.)
ST. JOSEPH, MICH.

BUSINESS REPLY CARD
NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

4¢ POSTAGE WILL BE PAID BY

INDUSTRY POWER

SHEPARD-BENNING BLDG.

ST. JOSEPH, MICH.

Use this READ-N-CIRCLE Card for FREE information

Your name_____ Title_____

Company name_____

Company address_____

City_____ Zone_____ State_____

100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122
123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145
146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168
400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422
423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445
446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468
500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522
523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545
546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568
569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591
700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722
723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745

INDUSTRY POWER March 1957

FIRST CLASS
PERMIT No. 19
(Sec. 34.9, P.L.&R.)
ST. JOSEPH, MICH.

BUSINESS REPLY CARD
NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

4¢ POSTAGE WILL BE PAID BY

INDUSTRY POWER

SHEPARD-BENNING BLDG.

ST. JOSEPH, MICH.

Use this READ-N-CIRCLE Card for FREE information

Your name _____ Title _____

Company name _____

Company address _____

City _____ Zone _____ State _____

100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122
123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145
146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168
400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422
423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445
446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468
500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522
523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545
546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568
569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591
700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722
723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745

INDUSTRY POWER March 1957

FIRST CLASS
PERMIT No. 19
(Sec. 34.9, P.L.&R.)
ST. JOSEPH, MICH.

BUSINESS REPLY CARD
NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

4¢ POSTAGE WILL BE PAID BY

INDUSTRY POWER

SHEPARD-BENNING BLDG.

ST. JOSEPH, MICH.

of connecting two—
350 MCM copper cables to three—
250 MCM flexible copper braids. The braids in turn are connected to 1-1/4" nichrome rods. CADWELD'S versatility of design and outstanding electrical properties solved the problem.

YOUR electrical connection problem due to:

1. Conductor construction
2. Type of conductor material
3. Overload and surge currents
4. Corrosive conditions
5. High ambient temperature

CAN BE SOLVED WITH . . .

CADWELD®

Erico Products, Inc.

2070 E. 61st Place · Cleveland 3, Ohio

IN CANADA: ERICO INCORPORATED, 3571 Dundas St., West, Toronto 9, Ontario

Circle 151 on READ-N-CIRCLE card for more data

handy guide

. . . to advertised products

AIR CLEANING EQUIPMENT

Dust collector tubes have 9 lives
Read page 28 and circle number 137
THE AEROTEC CORPORATION. Dust collector tubes prove long life under accelerated tests. Write for further details.

Save power with automatic orifice selection
Read page 38 and circle number 153
THE KIRK & BLUM MFG. CO. Damper arrangement conserves air, gives high efficiency.

Fully automatic dust collection
Read page 34 and circle number 147
THE NORTHERN BLOWER CO. Dust collection 'round the clock with Norblo automatic bag-type dust arrestors.

AIR CONDITIONING, HEATING, VENTILATING

Ventilate confined places
Read page 42 and circle number 113
COPPUS ENGINEERING CORP. Vano ventilator-exhauster removes undesirable fumes in confined places. Supplies fresh air.

Cut cooling tower maintenance costs
Read page 52 and circle number 142
HARTZELL PROPELLER FAN CO. Mail coupon for bulletin on cooling tower maintenance.

BOILERS AND BOILER ACCESSORIES

Safe, dependable steam since 1888
Read page 31 and circle number 114
BABCOCK & WILCOX CO. Investigate B&W record in steam generation for Alco Products, Inc.

Packaged steam generator tests
Read page 24 and circle number 135
FOSTER WHEELER CORPORATION. Read field report on extensive performance tests. Send for Bulletin No. PG-53-3.

Flash tanks for your blowdown system
Read page 51 and circle number 118
HENSZEY CO. Make Henszey flash tanks part of your automatic continuous blowdown system. Write for details.

Scotch-type boiler case history
Read page 27 and circle number 140
THE JAMES LEFFEL & CO. Read endorsement of these boilers by large manufacturer.

Heat water faster, cheaper
Read page 44 and circle number 128
THE JOHNSON CORPORATION. Write for literature giving further details on this heater that uses full pressure steam up to 250 psi. It gives faster, more efficient heat transfer.

Simplicity means safety
Read page 21 and circle number 110
MAGNETROL, INC. Almost unlimited operating life is offered by these boiler water level controls. Available for temperatures to 750 F.

BUILDING CONSTRUCTION, MATERIALS

Safe, strong welded grating
Read page 49 and circle number 154
STANDARD STEEL SPRING DIV., ROCKWELL SPRING & AXLE CO. Hexagonal cross bars give safe, long-wearing steel flooring. Write for complete details.

ELECTRIC DISTRIBUTION

Breaker stores in own compartment
Read page 25 and circle number 117
ALLIS-CHALMERS MANUFACTURING CO. Reversible center panel stores molded case breaker in cubicle. Reverse panel to use.

Save 5 ways on motor control centers
Read page 6 and circle number 120
CONTINENTAL ELECTRIC EQUIPMENT CO. Get five money-saving advantages with "Concentrol". Compare for yourself. Write for Bulletin 401.

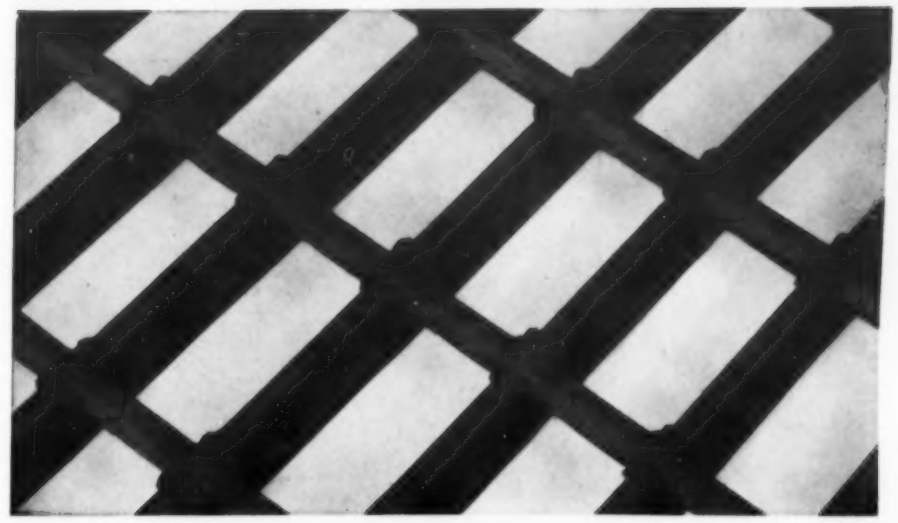
Protect with new insulating materials
Read page 23 and circle number 101
I-T-E CIRCUIT BREAKER COMPANY, SWITCHGEAR DIVISION. Latest developments in porcelain and ceramic insulating materials give extra value and protection—do not deteriorate.

For better power distribution
Read page 35 and circle number 104
SORGEL ELECTRIC CO. Read how large printing company distributes electric power with high voltage feeders to load centers.

Learn facts on dry-type transformers
Read page 26 and circle number 152
ACME ELECTRIC CORP. Investigate basic design, materials, construction features of Acme dry-type transformers.

Make the right connections
Read page 48 and circle number 151
ERICO PRODUCTS, INC. Let Cadweld's versatility make the right electric connections in your plant. Write for details.

(more handy guide on page 50)



Hexagonal Cross Bars...Resistance Welding make

Gary WELDED GRATING safer, stronger neat appearing

One piece construction with tops of all bars flush provides safer, longer-lasting open steel flooring. And it's tailor-made to fit your requirements. For typical installations and full details on Gary gratings, stair treads and decking, write for Catalog IP-37

FREE SAMPLE
We'll send this handy paper weight if you request it on your company stationery.

ROCKWELL SPRING & AXLE CO.
Standard Steel Spring Division
4000 EAST SEVENTH AVE., GARY, INDIANA

Circle 154 on READ-N-CIRCLE card for more data

NON-FLUID OIL
TRADE MARK REGISTERED

THE CHOICE OF LEADING AIR TOOL MANUFACTURERS

NON-FLUID OIL is used and recommended by most leading makers of portable air tools, because prolonged service tests have conclusively proven that NON-FLUID OIL enables their tools to perform more efficiently. Tool speeds are *increased*, and maintenance costs are *decreased*, when you use NON-FLUID OIL.

Remember, your new pneumatic tools will in all probability have been test run and rust proofed with NON-FLUID OIL, with the manufacturer's recommendation that you continue to use it to get the most from your tool investment.

Send for a sample of NON-FLUID OIL, and see for yourself how it stops harmful rust and sticking, and speeds up tools instantly.

NEW YORK & NEW JERSEY LUBRICANT COMPANY
292 MADISON AVE., NEW YORK 17, N. Y.
WORKS: NEWARK, N. J.

1898 61 1957 YEARS OF LUBRICATION SERVICE NON-FLUID OIL TO INDUSTRY

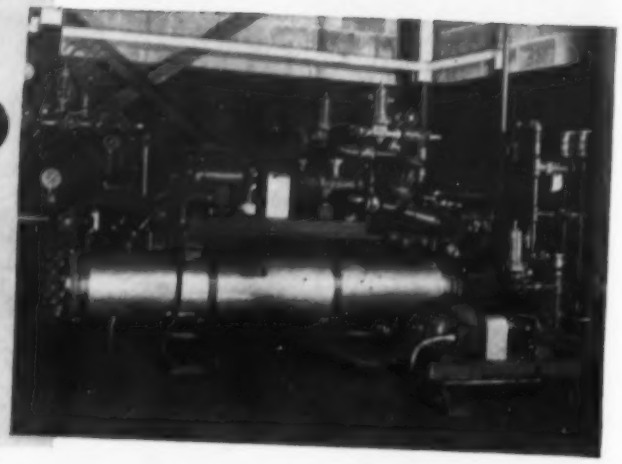
WAREHOUSES

Birmingham, Ala.	Greenville, S. C.	Greensboro, N. C.
Atlanta, Ga.	Chicago, Ill.	Detroit, Mich.
Columbus, Ga.	Springfield, Mass.	Providence, R. I.
Charlotte, N. C.		St. Louis, Mo.

NON-FLUID OIL is not the name of a general class of lubricants, but is a specific product of our manufacture.

Circle 111 on READ-N-CIRCLE card for more data

2 ENCO FUEL OIL UNITS *in this plant*



Here is a typical 2 unit installation of Enco fuel oil pump sets—selected to take care of all the requirements of a building materials manufacturer.

The Large Unit has 2 pumps and 2 heaters, completely automatic and arranged for operation with either heater, or either pump—or both. With one heater and pump the capacity is 11 gpm Bunker C oil at 300 psig pressure, and temperature rise from 90F to 230F.

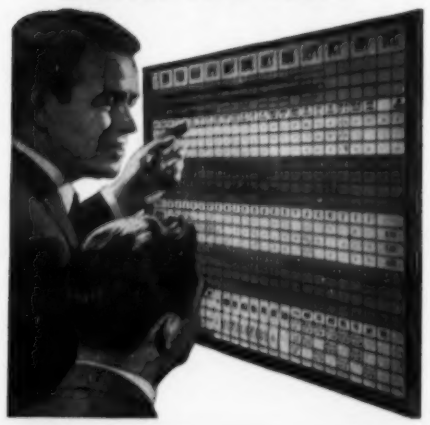
The Small Unit is for cold starting up—has no heater. The capacity is 3 gpm of No. 2 oil at 300 psig pressure.

All Enco sets are individually designed, each for specific plant conditions—for easy installation, low maintenance and minimum carefree operation.

Complete details including the 10 important features of Enco fuel oil heating and pumping sets are given in Bulletin OB53. Copies gladly sent upon request.

THE ENGINEER COMPANY, 75 West Street, New York 6, N. Y.
In Canada: Rock Utilities Ltd., 80 Jean Talon St. W., Montreal, P. Q.
Palser Enterprises, 378 York St., London, Ontario EC-807
Circle 141 on READ-N-CIRCLE card for more data

How To Get Things Done Better And Faster



BOARDMASTER VISUAL CONTROL

- ★ Gives Graphic Picture — Saves Time, Saves Money, Prevents Errors
- ★ Simple to operate — Type or Write on Cards, Snap in Grooves
- ★ Ideal for Production, Traffic, Inventory, Scheduling, Sales, Etc.
- ★ Made of Metal Compact and Attractive. Over 100,000 in Use

Full price $49.50 with cards

FREE 24-PAGE BOOKLET NO. P-20 Without Obligation

Write for Your Copy Today
GRAPHIC SYSTEMS
55 West 42nd Street • New York 36, N. Y.
Circle 119 on READ-N-CIRCLE card

The Greater the Pressure... the Tighter It Holds!

There's still nothing simpler or more efficient in power line service than this Wilcox Self-Sealing Gasket which has served industry so well over the years. The U-shaped metal outer cover is packed with a resilient filling (usually rubber or asbestos). Pressure exerted on this elastic filling forces it into the cover, putting force against the adjacent flange surfaces. Thus, internal pressure that tends to blow ordinary gaskets makes the Wilcox Gasket tighter in the joint. Available with covers of copper, lead, tin, aluminum, monel, stainless steel, etc. in all sizes—standard or special.

Write for details and quotations

CHICAGO-WILCOX MFG. CO.
7725 So. Avalon Ave.
Chicago 19, Ill.

Circle 126 on READ-N-CIRCLE card for more data

handy guide

. . . starts on page 49

ELECTRIC UTILIZATION

Clean, accurate, dependable heat
Read page 34 and circle number 112
EDWIN L. WIEGAND CO. Chromalox electric immerison heaters solve many heating problems. Write for Catalog 50.

FUELS AND FIRING EQUIPMENT

Bituminous coal can meet your needs
Read page 55 and circle number 139
BALTIMORE & OHIO RAILROAD. Convenient reserves offer unlimited supply for your industrial needs. Representative can help you.

Finest coals are superwashed
Read page 4 and circle number 148
BELL & ZOLLER COAL CO. Investigate exclusive line of superwashed coal.

Superior coal with superior service
Read page 43 and circle number 116
CHESAPEAKE AND OHIO RAILWAY. Superior coal treatment plus fast delivery add up to better performance and lower cost.

Engineered fuel-oil units
Read page 50 and circle number 141
THE ENGINEER COMPANY. Fuel-oil units individually designed for your plant conditions. Write for complete details.

Have you all the facts?
Read page 37 and circle number 125
MICHIGAN OVEN COMPANY. Send for this book of basic heat processing information written by the specialists — you'll find it useful.

New mining methods and equipment
Read page 46 and circle number 107
THE UNITED ELECTRIC COAL COMPANIES. UE's 6 big mines mean more coal for midwest industry. Uses all-water delivery route.

HEAT EXCHANGERS

Control hydraulic liquid temps
Read page 30 and circle number 122
NIAGARA BLOWER CO. Aero heat exchanger uses outdoor air to cool hydraulic liquids, water, oils, lubricants, or coolants.

INSTRUMENTS AND CONTROLS

Durable, long-lived gauges
Read page 32 and circle number 138
UNITED STATES GAUGE, DIVISION AMERICAN MACHINE AND METALS, INC. Rapid adjustment, easy removal, and durable construction are built in these gauges.

How to measure liquids accurately
Read page 30 and circle number 100
BUFFALO METER CO. Mail coupon for facts on dependable, accurate displacement meters for process control.

Get big savings in boiler plants
Read page 51 and circle number 145
CLEVELAND CONTROLS. Get information on modern practices that save money. Illustrated manual points the way. Write for Manual.

Relays used in many applications
Read page 40 and circle number 136
THE MERCOID CORPORATION. Get hundreds of circuit arrangements using Mercoid Transformer-Relays. Write for Bulletin No. 31.

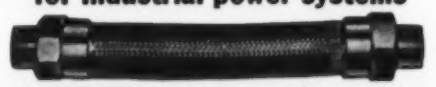
Dial thermometers suit any requirements
Read page 28 and circle number 102
PALMER THERMOMETERS, INC. Mercury actuated dial thermometers in three types are suitable for any application.

LUBRICATION

Use oil recommended by manufacturer
Read page 49 and circle number 111
NEW YORK & NEW JERSEY LUBRICANT COM-

COBRA® FLEXIBLE SEAMLESS METAL HOSE

Custom constructed assemblies for industrial power systems



All sizes in bronze, stainless or carbon steel, monel, inconel and low carbon nickel. Seamless spiral or parallel corrugation... Braided. All type of fittings and flanges welded, brazed or soldered. Also, interlocked hose.

write — wire — phone: RE 7-3311
...for prices and catalogs

COBRA METAL HOSE
4640 W. 54th Street • Chicago 32, Ill.
Circle 130 on READ-N-CIRCLE card

PANY. Why change from manufacturer's recommendations. Get increased tool speed and lower maintenance.

How to get more power with less fuel
Read page 56 and circle number 105
THE TEXAS CO. Case history reports show power performance improves when equipment is lubricated with Ursa oils.

MAINTENANCE ITEMS

Gaskets hold high pressures
Read page 50 and circle number 126
CHICAGO-WILCOX MFG. CO. Internal pressures that blow ordinary gaskets make Wilcox gasket tighter in the joint.

Planned maintenance helper
Read page 50 and circle number 119
GRAPHIC SYSTEMS. Boardmaster Visual Control gives graphic picture of your operations.

Good commutator maintenance saves $$
Read page 38 and circle number 108
IDEAL INDUSTRIES, INC. Periodic maintenance of commutators and slip rings is low-cost insurance against high-cost troubles.

Premixed patching mortar lasts longer
Read page 41 and circle number 132
THE MASTER BUILDERS CO. Add water and premixed mortar is ready to use. Outlasts plain cement-sand patches.

Gasket and packing always available
Read page 41 and circle number 103
RHOPAC, INC. Top quality gaskets and tapes, sheet gasket materials, packing hooks, and mechanical packings are always available.

Take the toil out of threading
Read page 5 and circle number 106
THE TOLEDO PIPE THREADING MACHINE CO. Try Toledo line of portable power tools.

Stop oil leaks
Read page 44 and circle number 149
LAKE CHEMICAL CO. Seal your leaks with Oyltite-Stik. Not affected by heat and cold, withstands normal vibration.

MATERIALS HANDLING (BULK)

Prevents bin flow bottlenecks
Read page 11 and circle number 123
GEROTOR MAY CORP. Pulsating neoprene panels inside bins prevent flow bottlenecks. PneuBin units fit inside your present bins.

PIPING, TUBING, AND HOSE

Seamless metal hose
Read page 50 and circle number 130
COBRA METAL HOSE. Use custom-constructed hose assemblies for your power system. All sizes available in bronze, stainless or carbon steel, Monel, Inconel, and low carbon nickel.

PUMPING EQUIPMENT

Designed for dependable operation
Read page 7 and circle number 121
DE LAVAL STEAM TURBINE COMPANY. Boiler feedpumps are designed for dependability. Proven by year in, year out service.

Pumps built for abuse
Read page 32 and circle number 131
NAGLE PUMPS, INC. Built for abusive applications. Complete range of sizes, horizontal- and vertical-shaft types.

TRAPS, STRAINERS, AND SEPARATORS

Performance guaranteed
Read page 26 and circle number 115
JAS. A. MURPHY & CO. These entirely automatic ball float traps are fully guaranteed.

Forged steel traps
Read page 10 and circle number 150
ARMSTRONG MACHINE WORKS. Traps cut superheated steam line drainage.

Need pipe strainers?
Read page 40 and circle number 144
ARMSTRONG MACHINE WORKS. Y-type strainers have corrosion-resistant steel screens.

VALVES AND REGULATORS

Reducing valve is maintenance free
Read page 29 and circle number 133
LESLIE CO. Diaphragm-operated, pressure-reducing valve has only two moving parts. Gives sensitive, maintenance-free service.

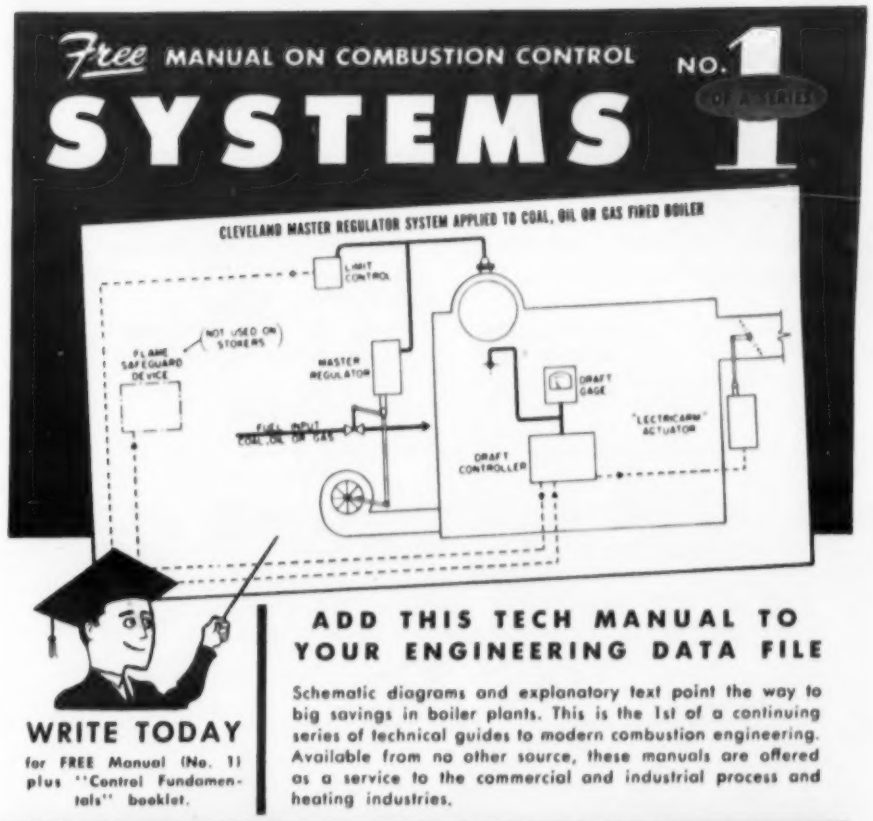
Steel valves fill the bill
Read page 45 and circle number 129
THE CHAPMAN VALVE MFG. CO. Gate, globe, check valves in all pressures, temps.

Valves for test stands
Read page 42 and circle number 146
REPUBLIC MANUFACTURING CO. Investigate RM line of quality valves.

WATER SUPPLY AND TREATMENT

Treatment terminates tubercles
Read page 2 and circle number 143
DEARBORN CHEMICAL COMPANY. Balanced water conditioning gives complete plant piping protection. Write for assistance backed by 70 years of experience.

(more handy guide on page 52)


Free MANUAL ON COMBUSTION CONTROL NO. 1
SYSTEMS
CLEVELAND MASTER REGULATOR SYSTEM APPLIED TO COAL, OIL OR GAS FIRED BOILER
LIMIT CONTROL
NOT USED ON STOKERS
FLAME SAFEGUARD DEVICE
MASTER REGULATOR
DRAFT GAGE
"ELECTRICARM" ACTUATOR
DRAFT CONTROLLER
COAL, OIL OR GAS
WRITE TODAY
for FREE Manual (No. 1) plus "Control Fundamentals" booklet.
ADD THIS TECH MANUAL TO YOUR ENGINEERING DATA FILE
Schematic diagrams and explanatory text point the way to big savings in boiler plants. This is the 1st of a continuing series of technical guides to modern combustion engineering. Available from no other source, these manuals are offered as a service to the commercial and industrial process and heating industries.
CLEVELAND CONTROLS
1111 Brookpark Rd. • Cleveland 9, Ohio
"100 Field Engineers To Serve You"
COMBUSTION CONTROL SYSTEMS
INDICATING INSTRUMENTS
AIR SAFETY SWITCHES
PANEL CONTROL CABINETS

Circle 145 on READ-N-CIRCLE card for more data

The march to
SAVINGS
HENSZEY
Flash Tanks
as part of your
automatic continuous
blowdown system
HENSZEY CO., Dept. A • Power Plant Division • Watertown, Wis.
Also Manufacturers of: Multiple Effect and Single Effect Evaporators and Tube Preheaters

Circle 118 on READ-N-CIRCLE card for more data

Switch to sludge-free salt
Read page 8 and circle number 109
MORTON SALT CO. Purex high-purity evaporated salt gives controlled particle size. 100% soluble. Leaves no sludge. Try it today.

Water treatment problem case history
Read page 33 and circle number 124
NORTH AMERICAN MOGUL PRODUCTS CO. Read endorsement by company using Mogul products to keep heating and air conditioning in top shape.

Single responsibility with package plan
Read page 22 and circle number 134
RANNEY METHOD WATER SUPPLIES, INC. Package plan handles every phase of water supply with single responsibility. Write for data.

Complete feedwater treatment offered
Read page 24 and circle number 127
HUNGERFORD & TERRY, INC. Complete plants for all feedwater requirements. Write for details in Bulletin BFT-11. ♦♦

HOW TO CUT COOLING TOWER MAINTENANCE COSTS

Hartzite plastic fan blades practically eliminate fan blade replacement problems in cooling towers and heat exchangers. They effectively resist corrosion, abrasion and vibration. Hartzite blades are constructed stronger to last longer. These tough, rugged blades are made of a phenolic-impregnated fabric-base material — solid construction . . . won't scale, won't peel . . . means low maintenance.

The hub section is dynamically balanced . . . solidly constructed of welded steel . . . with gussets for extra strength and increased safety.

Hartzite plastic fans are available in sizes from 10′ to 22′. Hubs are designed for 2, 3, 4 or 6 blade assemblies.

Find out more about how Hartzell helps you to cut cooling tower maintenance costs. Mail the coupon below for new bulletin A111B, "Cooling Tower and Heat Exchanger Fans".

HARTZELL PROPELLER FAN CO.
Piqua (Cable Hills Corp.)

Please send me a copy of Bulletin A-111B. 710 THOMAS BLVD., PIQUA, OHIO

NAME_____

COMPANY_____

ADDRESS_____

CITY_____ STATE_____

Circle 142 on READ-N-CIRCLE card for more data

reprints available

. . . from industry power

Single copies of following reprints are available free. Quantity orders for individual reprints quoted on request. Address all correspondence, on company letterhead, please, to Reader Service Department, INDUSTRY POWER, Shepard-Benning Building, St. Joseph, Michigan.

- *Big Savings for a Small Plant*
- *Bulk Handling as a Business*
- *Check That Steam Drum*
- *Cool Your Plant With Central Units*
- *Correction Table for Estimating Heating Value of Coal*
- *Dual Variable Pitch Pulleys*
- *Electric Drives Control Coal Feed to Dryers*
- *Engineered Insulation*
- *Fire Either Coal or Oil*
- *For Better Lighting at Less Cost, Frost Your Windows*
- *Fume Elimination May Be Only Half the Story*
- *Gas Furnaces or Electric Furnaces*
- *Hot Materials Demand Special Conveyor*
- *How Do You Control Planned Maintenance*
- *How Chrysler Licked a Maintenance Headache*
- *Inplant Testing for your Boiler Water*
- *L. P. Means Loss Protection*
- *Lessons for Multi-Building Plants High-Temperature Water*
- *Lightweight, 30,000-Ampere Aluminum Bus*
- *Millwater System Saves Water and Money for Ford*
- *More Steam for Less Money*
- *New Chemical Grouting Method Prevents Flooded Floors*
- *Permanent Tank Insulation Costs Less*
- *Put Dissolved Air to Work*
- *Selecting Taps on Power Transformers*
- *Shell Selects Package Boiler for Outdoor Operation*
- *Small Filters Do Big Job*
- *Standard Switchgear Offers Tailormade Job Fast*
- *Switch to Centralized Controls*
- *Tailor-Made Fire Protection*
- *Television . . . The Eyes of Industrial Control*
- *What To Do About Anion Resin Deterioration*
- *What You Should Know About Fuel Oil Additives*
- *Why Not Try Simplicity in Valve Controls?*

Special Report Reprints

Individual copies of Special Report Reprints are free. Rates for quantity orders sent on request.

- *Combating Corrosion From Industrial Chemicals*
- *Contaminants in the Air*
- *Demineralization — A Means to Purer Water*
- *Inplant Electric Distribution*

Power Basics Booklets

Our new Power Basics Series are now available at 50¢ per copy. Rates for quantity orders sent on request. Send in your order today.

- *Power Basics I: Thermodynamics*
- *Power Basics II: Electricity*
- *Power Basics III: Air Conditioning and Refrigeration*

Classified Advertising

complete Anhydrous Ammonia and L.P. Gas plants designed - installed
H. Emerson Thomas & Associates, Inc.

PROPANE GAS PLANTS
and
Anhydrous Ammonia Plants
PEACOCK CORPORATION
Box 268, Westfield, N. J. Westfield 2-6258

Save on Your INDUSTRIAL TRACK
FOSTER QUALITY FULLY GUARANTEED
RELAYING RAILS
Handle more cars better—cost less to install and maintain. Foster stocks all Rail Sections 12# thru 175#, Switch Material and Track Accessories.
SEND FOR CATALOGS
RAILS · TRACK EQUIPMENT · PIPE · PILING
L B FOSTER CO.
PITTSBURGH 30 • NEW YORK 7 • CHICAGO 4
ATLANTA 8 • HOUSTON 2 • LOS ANGELES 5

the LOCATOR

. . . . a quick guide to advertisers' sales and service offices in your area

CITY BY CITY, here are the local offices of INDUSTRY POWER'S advertisers waiting to serve you in your area. When you want quick information about any products or services you see described, look up the city nearest you under the listing for the advertiser you wish to reach. You will find local address and telephone number. Home office listings are shown for all advertisers whose local offices are not listed.

ACME ELECTRIC CORP. .....Page 26
CUBA, N. Y.: (Home Office) 52 Water St.

AEROTEC CORP. .....Page 28
See Thermix Corp.

ALLIS-CHALMERS MFG. CO. .....Page 25
MILWAUKEE 1, WIS.: (Home Office) 1126 So. 70th St.

ARMSTRONG MACHINE WORKS .....Pages 10, 40
THREE RIVERS, MICH.: (Home Office) 8201 Maple St.

BABCOCK & WILCOX CO., BOILER DIV. .....Page 31
NEW YORK 17, N.Y. (Home Office) 161 E. 42nd St.

BALTIMORE & OHIO RAILROAD ...Page 55
BALTIMORE 1, MD.: (Home Office) Baltimore and Charles Sts., LExington 9-0400.

BELL & ZOLLER COAL CO. .....Page 4
CHICAGO, ILL.: (Home Office) 307 N. Michigan Ave.

W. H. & L. D. BETZ .....Page 9
PHILADELPHIA 24, PA.: (Home Office) Gillingham & Worth Sts.

BUFFALO METER CO. .....Page 30
BIRMINGHAM, ALA.: Hayden Engrg. Sales Co., 210 Hollywood Blvd., TRemont 1-0637.
DENVER 5, COLO.: Joy & Cox, Inc. 2124 B'way, AMherst 6-0323.
EL PASO, TEX.: Steel & Engrng. Prod. Co., P. O. Box 32, Phone 3-1321.
HOUSTON 24, TEX.: Snyder Co., Inc., P. O. Box 10134, WAlnut 3-2641.
LOS ANGELES, CALIF.: W. R. Ladewig, 5608 E. Washington Blvd., RAymond 3-6371.
NEW ORLEANS 19, LA.: Frieshon & Belsom, P. O. Box 7044, VErnon 5-3165.
ODESSA, TEX.: Snyder Co., Inc., 709 West County Rd., FEderal 2-9408.
SALT LAKE CITY, UTAH: Wm. Z. Harrison Co., 436 Atlas Bldg., 5-1242.
SAN FRANCISCO, CALIF.: T. R. Routh Co., 1209 Capuchino Ave., Burlingame, Calif., DIamond 2-4147.
SEATTLE 4, WASH.: Burhans-Sharpe Co., 113 First Ave. S., MAin 9006.
TULSA 10, OKLA.: Snyder Co., Inc., 1432 E. 6th St., GIlson 7-0126.

CHAPMAN VALVE MFG. CO. .....Page 45
INDIAN ORCHARD, MASS.: (Home Office)

CHESAPEAKE & OHIO RAILWAY ...Page 43
CLEVELAND 1, OHIO: (Home Office) Terminal Tower.

CHICAGO-WILCOX MFG. CO. ....Page 50
CHICAGO 19, ILL.: (Home Office) 7725 S. Avalon Ave.

CLEVELAND FUEL EQUIPMENT CO. .....Page 51
CLEVELAND 9, OHIO: (Home Office) 111 Brookpark Rd.

COBRA METAL HOSE, DIV. OF DK MFG. CO. .....Page 50
PLANO, TEX.: (Home Office) Eastman Products Corp.

CONTINENTAL ELECTRIC EQUIPMENT CO. .....Page 6
DENVER 6, COLO.: Colorado Western Sales Co., Box 4, Capitol Hill Station.
JENKS, OKLA.: Wayne G. Parker Co., Box 632.
LOS ANGELES 17, CALIF.: Robert M. Schow Co., 1709 West 8th St.
NEW ORLEANS, LA.: Jones-Philibert and Co., 358 Sauve Rd.
OMAHA, NEB.: F. C. Clatterbaugh, 3326 N. 40th St.
PHOENIX, ARIZ.: W. H. Eddy Electric Products Co., Box 1428.
SAN FRANCISCO 7, CALIF.: Walter E. Wallace Co., 435 Bryant St.
SEATTLE 44, WASH.: Muth-Richards Co., 1804 Bush Pl.

COPPUS ENGINEERING CORP. ....Page 42
WORCESTER, MASS.: (Home Office) 262 Park Ave.

DEARBORN CHEMICAL CO. .....Page 2
BAKERSFIELD, CALIF.: E. A. LeDuc, 2113 Greenwood Dr.
BIRMINGHAM 6, ALA.: T. Armstrong, 321 Mignon Ave.
DALLAS 6, TEX.: E. M. Welch, 205 Suburban Bldg.
DENVER 2, COLO.: B. K. Wheatlake, Rm. 245, Equitable Bldg.
LOS ANGELES 21, CALIF.: W. R. Wieschendorff, A. R. Guenther, 807-815 Mateo St.
ODESSA, TEX.: B. H. Leverenz, P. O. Box 2083.
OMAHA 3, NEB.: R. F. Hutchinson, R. S. Johnson, 4510 Cuming St.
PORTLAND 19, ORE.: R. S. Baynham, 10495 S.W. 71st Ave.
SEATTLE 5, WASH.: E. S. Bus, 4738-38th Ave., N. E.
TULSA 3, OKLA.: R. W. Kelly, 211 Midco Bldg.
WHITE DEER, TEX.: J. R. St. Clair, P. O. Box 23, 300 Grimes St.

DE LAVAL STEAM TURBINE CO. ....Page 7
TRENTON 2, N. J.: (Home Office) 857 Nottingham Way.

ENGINEER CO. .....Page 50
ALEXANDREA, LA.: Roy Cookston, 1847 Marye St.
ENGLEWOOD, COLO.: J. F. White Engineering Co., Box 144.
HOUSTON 2, TEX.: Johnson-Heyck, Inc., 430 West Bldg.
LOS ANGELES 22, CALIF.: Solar Combustion Co., 1220 S. Gearhart Ave., RAymond 3-3144.
MOBILE, ALA.: R. L. Bidez, 14 Bienville Ave.
PORTLAND 9, ORE.: Guy A. Heard & Co., 1205 N.W. Marshall.
SAN ANTONIO 6, TEX.: R. H. Knipping, Inc., 300 Blum St.
SEATTLE 5, WASH.: Guy A. Heard & Co., 3753 Brooklyn Ave. EVergreen 0088.
TUCSON, ARIZ.: Central Station Equip. Co., 2323 Aviation Highway.

ERICO PRODUCTS CO. .....Page 48
CLEVELAND, OHIO: (Home Office) 2070 E. 61st Place.

FOSTER WHEELER CORP. .....Page 24
DALLAS 1, TEX.: 505 North Ervay St.
HOUSTON 2, TEX.: 711 Main St.
LOS ANGELES 15, CALIF.: 714 W. Olympic Blvd.
SAN FRANCISCO 5, CALIF.: 461 Market St.

GEROTOR MAY CORP. .....Page 11
OWINGS MILLS, MD.: (Home Office)

GRAPHIC SYSTEMS INC. .....Page 50
NEW YORK, N. Y.: (Home Office) 55 W. 42nd St.

HARTZELL PROPELLER FAN CO. ....Page 52
BIRMINGHAM 3, ALA.: 544 American Life Bldg., 4-3394.
DALLAS, TEX.: 303 Interurban Bldg., STerling 2952.
HOUSTON 5, TEX.: 5717 Kirby Dr., JAckson 3-4565.
KANSAS CITY 1, KAN.: 602 Minnesota Ave., DRexel 1-1580.
LITTLE ROCK, ARK.: 1009 Cavanaugh St., MOhawk 6-2059.
LOS ANGELES, CALIF.: 2325 Torrance Blvd., Torrance, FAirfax 8-2804.
NEW ORLEANS 2, LA.: P. O. Box 779, RAymond 6243.
OMAHA, NEB.: 5101 Biondo St., Glendale 3803.
SALT LAKE CITY, UTAH: 81 E. 7th South, EMpire 4-1136.
SAN FRANCISCO, CALIF.: Bank of America Bldg., Santa Clara, CHerry 3-3217.
SEATTLE 4, WASH.: 1731 1st Ave. South, SEneca 1955.
TULSA, OKLA.: 1437 S. Main St., CHerry 2-9376.
WICHITA, KAN.: 1145 N. Main St. AMherst 5-5603.

HENSZEY CO. .....Page 51
BIRMINGHAM, ALA.: Industrial Furnace Co., Inc., 2709 5th Ave., South.
BOISE, IDAHO: Richardson Equipment Co., 612 Front St., P. O. Box 902.
DALLAS 6, TEX.: J. P. Ashcraft Co., 5643 Dyer St.
DENVER, COLO.: J. B. Ambler, P. O. Box 591.
EL PASO, TEX.: Boyd Industrial Engineering Co., P. O. Box 3484, or 609 Laurel St.
LOS ANGELES, CALIF.: Frank M. Beeson, 1511 W. 27th St.
NEW ORLEANS, LA.: Process Equipment Co., 1623 Dumaine St.
PORTLAND 10, ORE.: R. H. Brown & Co., 5825 N. W. Front Ave.
SALT LAKE CITY 10, UTAH: Thermal Engineering Co., P. O. Box 446.
SAN ANTONIO 6, TEX.: R. H. Knipping, 300 Blum St., P. O. Box 367.
SAN FRANCISCO 3, CALIF.: J. O. Martin Co., Inc., 637 Minna St.
SEATTLE, WASH.: Barrett & Yost, 5600 14 St., N. W.
TULSA 10, OKLA.: Snyder Co., Inc., 1432 E. Sixth St.

HUNGERFORD & TERRY, INC. .....Page 24
DALLAS, TEX.: H. O. Knape, 3002 Commerce St., PRospect 7596.
HOUSTON, TEX.: H. O. Knape, 811 Waugh Drive, JAckson 8-2896.
LOS ANGELES 22, CALIF.: Chas. P. Crowley Co., 5430 Jillson St., RAymond 3-6555.
NEW ORLEANS 20, LA.: S. G. Davis, 475 Woodvine Ave., CEdar 9093.
SALT LAKE CITY, UTAH: North-Monsen Co., Box 174, 2520 South State St., HUnter 4-2023.

IDEAL INDUSTRIES, INC. .....Page 38
SYCAMORE, ILL.: (Home Office) 1006 Park Ave.

I-T-E CIRCUIT BREAKER CO., SWITCHGEAR DIV. .....Page 23
BATON ROUGE, LA.: Gregory-Salisbury Co. 4445 Sweetbriar St.
BIRMINGHAM, ALA.: Jos. W. Eshelman & Co., Inc., 1812 28th Ave., South, Homewood, P. O. Drawer 5768.
BUTTE, MONT.: R. E. McDonough Company, 829 Maryland Ave., Box 278.
DALLAS 5, TEX.: Box 5085.
DENVER 3, COLO.: 655 Broadway Bldg., Room 410.
EL PASO, TEX.: Electrical & Mechanical Supply Co., Inc., Box 137, 2000 Texas St.
HOUSTON 6, TEX.: Box 6466, 2032 Dunlavy St.
JACKSON 5, MISS.: Gregory-Salisbury & Co., Inc., 429 South West St., Box 1085.
LITTLE ROCK, (PINE BLUFF) ARK.: Gregory-Salisbury & Co., Inc., 820 Julia St.
LOS ANGELES 22, CALIF.: 130 South Atlantic Blvd.
NEW ORLEANS 12, LA.: Gregory-Salisbury & Co., Inc., 820 Julia St.
OMAHA 2, NEBR.: Conrad R. Bangh, WOW Building, Room 524, 14th and Farnam St.
PORTLAND 9, ORE.: Garland-Affolter Eng. Corp., 1233 North West 12th Ave.
SALT LAKE CITY 1, UTAH: Riter Engineering Company, Room 422, 136 S. Main St.
SAN FRANCISCO 7, CALIF.: I-T-E Circuit Breaker Company, 320 Fourth St.
SEATTLE 1, WASH.: Garland-Affolter Eng. Corp., 2603 Western Ave.
SHREVEPORT, LA.: Butler & Land, Box 3584, 1845 Line Avenue, Room 304.
TUCSON, ARIZ.: Central Station Equipment Company, 2323 Aviation Highway.
TULSA, OKLA.: I-T-E Circuit Breaker Co., Room 201, 822 East Sixth St.

JOHNSON CORP. .....Page 44
THREE RIVERS, MICH.: (Home Office) 807 Wood St.
BIRMINGHAM 1, ALA.: Southeastern Products Corp., 1401 Lomb Ave.
DALLAS 2, TEX.: Geo. B. Allan & Co., 801 S. Akard St.
DENVER 7, COLO.: Thermal Industrial Engrg. Co., 1932 Cherry St.
LOS ANGELES 15, CALIF.: Guy L. Warden & Sons, 209 W. 12th St.
NEW ORLEANS 13, LA.: Louisiana Steam Equipment, 1118 Tchoupitoulas St.
PHOENIX, ARIZ.: John W. Ladlow, Box 1784.
PORTLAND 5, ORE.: Forsyth-Constant Co., 921 S. W. Oak St.
SALT LAKE CITY 1, UTAH: Pace-Turpin & Co., 726 South 3rd West.
SAN FRANCISCO 5, CALIF.: Calpacific Equipment Co., 50 Hawthorne St.
SEATTLE 99, WASH.: Arthur Forsyth Co., 2800 - 15th Ave., W.

THE KIRK & BLUM MFG. CO. .....Page 38
DENVER 23, COLO.: Landis, Zachary & Peterson, 275 Kalamath St., MA 3-6203.
NEW ORLEANS, LA.: Mid-South Sales, 4424-B Earhart Blvd., TUlane 4683.

LAKE CHEMICAL CO. .....Page 44
CHICAGO 12, ILL.: (Home Office) 3070 W. Carroll Ave.

THE JAMES LEFFEL & CO. .....Page 27
SPRINGFIELD, OHIO: (Home Office) 426 East St.

(more Locator on page 54)

the LOCATOR

. . . starts on page 53

CITY BY CITY, here are the local offices of INDUSTRY POWER'S advertisers waiting to serve you in your area. When you want quick information about any products or services you see described, look up the city nearest you under the listing for the advertiser you wish to reach. You will find local address and telephone number. Home office listings are shown for all advertisers whose local offices are not listed.

LESLIE CO. .....Page 29
ALBUQUERQUE, N. MEX.: Landes, Zachary & Peterson.
AMARILLO, TEX.: S. C. Covington Co., Inc.
BIRMINGHAM, ALA.: Gaeggel Engrg. Co., Inc.
BOSIE, IDAHO: Landes, Zachary & Peterson.
CASPER, WYO.: Landes, Zachary & Peterson.
DALLAS, TEX.: Bernhard Engrg. Sales Co.
DENVER, COLO.: Landes, Zachary & Peterson.
EL PASO, TEX.: Landes, Zachary & Peterson.
HOUSTON, TEX.: Robert B. Stockdale.
NEW ORLEANS, LA.: Creole Engineering.
OMAHA, NEBR.: Pioneer Pipe & Supply Co., Inc.
PONCA CITY, OKLA.: Kappele Engineering Co.
PORTLAND, ORE.: John H. Marvin Co.
SALT LAKE CITY, UTAH: Landes, Zachary & Peterson.
SAN ANTONIO, TEX.: Ace Supply Company.
SAN FRANCISCO, CALIF.: Claude B. Smith Co.
SANTA ANA, CALIF.: Frank Bueche Co.
SEATTLE, WASH.: John H. Marvin Co.
SHREVEPORT, LA.: Dykes Co.

MAGNETROL, INC. .....Page 21
ALBUQUERQUE, N. MEX.: Landes, Zachary & Peterson, 1609-2nd St., N. W., 2-7761.
BIRMINGHAM 9, ALA.: Heckeroth Engineering Sales Co., Homewood Station, Box 5727, 2-2866.
CASPER, WYO.: Landes, Zachary & Peterson, 2421 East 4th St., 3-3610.
DALLAS, TEX.: Eggelhof Engineers, 4331 Belmont, VIctor 2505.
DENVER 23, COLO.: Landes, Zachary & Peterson, 275 Kalamath St., MAin 3-6203.
GRAND JUNCTION, COLO.: Landes, Zachary & Peterson, 2701 South Hiway, 1609.
HOUSTON 11, TEX.: Industrial Equipment Co. of Houston, 6831 Navigation Blvd., WAlnut 8-5431.
LOS ANGELES 39, CALIF.: Berkley Engr. & Eqpt. Co., 2439 Riverside Dr., NOrmandy 3-8291.
NEW ORLEANS 15, LA.: Eggelhof Engineers, Humble Oil Bldg., Room 234, GAlvez 4616.
OAKLAND 12, CALIF.: Johnson Engineering Co., 534-20th St., GLencourt 2-4488.
OMAHA 4, NEB.: Deco Engineering Products, 4305 North 54th St., PLeasant 1523.
SALT LAKE CITY, UTAH: Landes, Zachary & Peterson, 153½ West Second South St., 22-0812.
SEATTLE 4, WASH.: The Burhans-Sharpe Co., 1743 First Ave., South, MAin 9006.
SHREVEPORT, LA.: Eggelhof Engineers, 753 Gladstone St., 8-2451.
TULSA, OKLA.: Allan Edwards Co., P. O. Box 7218, 2445 South Jackson, 3-7184.
WICHITA, KAN.: Economy Equipment Co., 303 Pattie Ave., 7-5155.

MASTER BUILDERS CO. .....Page 41
CLEVELAND 3, OHIO: (Home Office) 7016 Euclid Ave.

THE MERCOID CORP. .....Page 40
DENVER 16, COLO.: J. M. Warner Co., 600 W. 48th Ave.
HOUSTON, TEX.: Industrial Equipment Co., P. O. Box 9155.
LOS ANGELES, CALIF.: Jensen Instrument Co., 1919 W. Beverly Blvd.
NEW ORLEANS, LA.: Frank P. Fischer Engr. Co., 7924 Maple St.
SALT LAKE CITY, UTAH: Stevens Sales Co., 1462 Major St.
SAN FRANCISCO, CALIF.: Jensen Instrument Co., 429 Bryandt St.
SEATTLE 1, WASH.: E. H. Langdon Co., 72 Vine St.
TULSA, OKLA.: Paul King Co., 28 N. Guthrie.

MICHIGAN OVEN CO. .....Page 37
DALLAS, TEX.: Bishop Engineering Co., 2808 Oak Lawn Ave.
DENVER 7, COLO.: Fred E. Blair, Blair Engineering Co., 4100 Grape St.
HOUSTON 4, TEX.: M. K. Griggs Co., Inc., 2801 San Jacinto Ave.
LOS ANGELES 22, CALIF.: The A. W. Nash Co., 2112 S. Atlantic Blvd.
TULSA, OKLA.: Bishop Engineering Co., 930 E. 36th St.

MORTON SALT CO. .....Page 8
CHICAGO 3, ILL.: (Home Office) 120 S. LaSalle.
DALLAS 2, TEX.: B. W. Carrington, Jr., 1407 Main St.
DENVER, COLO.: E. R. Black, 933 Sherman St.
LOS ANGELES 21, CALIF.: D. J. Randall, 1350 Produce St.
NEW ORLEANS 13, LA.: Ashby Cameron, 1111 Tulane Ave.
SALT LAKE CITY 11, UTAH: J. C. Coult, 1604 Walker Bank Bldg.
SAN FRANCISCO 5, CALIF.: G. W. Griswold, C. J. Loges, 525 Market St.
SEATTLE 4, WASH.: E. J. White, 1201 - 4th Ave., S.

JAS. A. MURPHY & CO., INC. .....Page 26
HAMILTON, OHIO: (Home Office) Box 614.

NAGLE PUMPS, INC. .....Page 32
DENVER 2, COLO.: The Mine & Smelter Supply Co., 1642-1698 Blake St.
EL PASO, TEX.: The Mine & Smelter Supply Co., 410 San Francisco Ave.
HOUSTON, TEX.: Johnson-Heyck, Inc., 430 West Bldg.
LOS ANGELES, CALIF.: Frederick Pump & Engineering Co., 1245 South Boyle Ave.
NEW ORLEANS 16, LA.: Roussel Pump & Electric Co., 1623 Dumaine St.
OAKLAND 20, CALIF.: H-W Engineering Co., 349 Cypress St.
OKLAHOMA CITY 9, OKLA.: Robertson Equipment Co., 2415 South Agnew St.
SALT LAKE CITY, UTAH: The Mine & Smelter Supply Co., 121 West 2nd South St.
SEATTLE 14, WASH.: H. D. Fowler Co., Inc., P. O. Box 3084, 9th Ave. S. & Laine St.
SPOKANE 31, WASH.: General Machinery Co., P. O. 4227 Station B.

NEW YORK & NEW JERSEY LUBRICANT CO. .....Page 49
NEW YORK 17, N. Y.: (Home Office) 292 Madison Ave.
DALLAS 1, TEXAS: Textile Supply Co., 1602 Cedar Springs.

NIAGARA BLOWER CO. .....Page 30
NEW YORK 17, N. Y.: (Home Office) 405 Lexington Ave.

NORTH AMERICAN MOGUL PRODUCTS CO. .....Page 33
CLEVELAND, OHIO: (Home Office) 1370 Ontario St.

NORTHERN BLOWER CO. .....Page 34
CLEVELAND 2, OHIO: (Home Office) 6500 Barberton Ave.

PALMER THERMOMETERS, INC. ....Page 28
DENVER 11, COLO.: Process Equipment Co., 1663 Central St., GLendale 5-4766.
HOUSTON 11, TEX.: Esch & Associates, Inc., Box 9361, Central Park Station. WA-83357.
LOS ANGELES 23, CALIF.: H. D. Prowell Co., Inc., 1248 S. Boyle Ave., ANgelus 1-5128.
LUBBOCK, TEX.: Harlan Engineering Co., Box 151, 2-1302.
MOBILE, ALA.: Frank A. Thomas Co., 8-½ St. Francis St., HEmlock 3-4170.
NEW ORLEANS 25, LA.: Wm. S. Huey, Box 13276, 4040 Thalia St.
PORTLAND 12, ORE.: Bert Farnes Company, 317 Builders Exchange Bldg., CApitol 7-1766.
SAN FRANCISCO 3, CALIF.: Norman Brown, 765 Minna St., UNderhill 1-0144.
SEATTLE 4, WASH.: Fairman B. Lee Co., 219 Central Bldg., EL 3582.
TULSA 9, OKLA.: Arduser & Co., Box 4267, GIbson 7-8311.

RANNEY METHOD WATER SUPPLIES, INC. .....Page 22
SACRAMENTO, CALIF.: 2015 J. Street, Suite 30, Duke Bldg.

REPUBLIC MFG. CO. .....Page 42
VAN NUYS, CAL.: Carl Drenske, 15139 Valerio St.

RHOPAC, INC. .....Page 41
SKOKIE, ILL.: (Home Office) 3424 Cleveland.

SORGEL ELECTRIC CO. .....Page 35
ATLANTA, GA.: Osgood & Associates, P. O. Box 7383 - Station C. TRinity 5-7804.
BUFFALO 21, N. Y.: C. V. Stevens, 5495 Main St., PLaza 0300.
CHICAGO 41, ILL.: L. L. Weldy & Associates, 4201 W. Irving Park Rd., Spring 7-8575 and 7-8576.
CLEVELAND 15, OHIO: Harvey E. Lakin, 3521 Euclid Ave., Endicott 1-6748.
COVINGTON, KY.: H. E. Bracke, 1053 Madison Ave., Hemlock 1-2299.
DAVENPORT, IOWA: Midwest Equipment Co. of Iowa, P. O. Box 532, 7-7074.
DES MOINES 14, IOWA: Midwest Equipment Co. of Iowa, 842 Fifth Ave., CHerry 3-1203.
DETROIT 35, MICH.: Wm. H. Yeomans, 15926 West McNichols Rd., Vermont 8-1808.
GREENSBORO, N. C.: Max I. Miller, P. O. Box 2826, 3-7955.
INDIANAPOLIS 20, IND.: Kyle G. Herder, P. O. Box 5952, Clifford 5-1361.
KANSAS CITY 8, MO.: Fleming & Co., 3021 Main St., Plaza 3-0111 and 3-0112.
LOS ANGELES 23, CALIF.: H. D. Easterbrook, 1264 South Boyle Ave., ANgelus 9-9421.
MILWAUKEE 2, WIS.: L. L. Weldy & Associates, 833 E. Kilbourn Ave., Broadway 3-6761.
MINNEAPOLIS 15, MINN.: Electrical Jobbers Equipment Co., 619 Fourth Ave., South, Federal 6-6321.
NEW YORK 36, N. Y.: Elmer Richards, 11 West 42nd St., Rm. 1302, LOngacre 4-5643.
NORFOLK 3, VA.: W. A. Bristol Co., 8725 Commodore Dr., JUstice 9-6114.
OMAHA 2, NEB.: Midwest Equipment Co. of Omaha, 1614 Izard St., ATlantic 7600.
PHILADELPHIA 6, PA.: Clisby & Associates, 28 South Delaware Ave., WAlnut 2,2185.
PITTSBURGH 36, PA.: Wm. E. Wargo, 125 Green Drive, TUxedo 4-3977.
PORTLAND 9, ORE.: Fred W. Carlson & Assoc. 935 Northwest 12th Ave., Rm. 133, CA 8-3798.
QUINCY 69, MASS.: Kenneth F. McIsaac, 11 Campbell St., PResident 3-7731.
ST. LOUIS 16, MO.: Charles H. Douglas, 4445 Gustine Ave., Flanders 1-1100.
SAN FRANCISCO 10, CALIF.: Campbell & George Co., 1601 Cortland Ave., Mission 8-1236.
SEATTLE 9, WASH.: Fred W. Carlson, 1201 Dexter Ave., ELliott 6630.
SHREVEPORT, LA.: Jack D. Clark, 2850 Bibb St., 6-9835.

STANDARD STEEL SPRING, DIV. OF ROCKWELL SPRING & AXLE CO. ..Page 49
GARY, IND.: (Home Office) 4040 E. Seventh Ave.

TEXAS CO. .....Page 56
NEW YORK, N. Y.: (Home Office) 135 E. 42nd St.
BUTTE, MONT.: 220 N. Alaska St.
DALLAS 2, TEX.: 311 S. Akard St.
DENVER 3, COLO.: 1370 Grant St.
HOUSTON 2, TEX.: 720 San Jacinto St.
LOS ANGELES 15, CALIF.: 929 S. Broadway.
NEW ORLEANS 16, LA.: 1501 Canal St.
SEATTLE 1, WASH.: 1511 Third Ave.

THERMIX CORP. .....Page 28
ALBUQUERQUE, N. MEX.: Landes, Zachary & Peterson, P. O. Box 3245.
DENVER 23, COLO.: Landes, Zachary & Peterson, 275 Kalamath St.
EL PASO, TEX.: Landes, Zachary & Peterson 312 East Missouri St.
GRAND JUNCTION, COLO.: Landes, Zachary & Peterson, P. O. Box 396.
HOUSTON 1, TEX.: The J. A. Rossiter Co., P. O. Box 1095.
LOS ANGELES 7, CALIF.: Southport Engineering Co., 235 West 32nd St.
NEW ORLEANS 12, LA.: Arlesco Company, Inc., 1221 Carondelet Bldg.
SALT LAKE CITY 10, UTAH: The Lang Company, Inc., P. O. Box 479.
SAN FRANCISCO 11, CALIF.: The Fulcher Co., 24 California St.
SEATTLE 4, WASH.: Fairman B. Lee Co., 219 Central Bldg.
TULSA 5, OKLA.: Vanco Engineering Co., P. O. Box 7222.

TOLEDO PIPE THREADING MACHINE CO. .....Page 5
TLOEDO, OHIO: (Home Office) 1431 Summit St.

UNITED ELECTRIC COAL COMPANIES .....Page 46
CHICAGO, ILL.: (Home Office) 307 N. Michigan Ave.

U.S. GAUGE, DIV. OF AMERICAN MACHINE & METALS, INC. .....Page 32
SELLERSVILLE 31, PA.: (Home Office).

EDWIN L. WIEGAND CO. .....Page 34
DALLAS 26, TEX.: L. R. Ward Company, 3009-11 Canton St., RIverside 6279.
DENVER 2, COLO.: Richards & Associates, Inc., 2415 15th St., GLendale 5-3651, 5-3652.
HOUSTON 3, TEX.: L. R. Ward Company, 1814 Texas Avenue, CApital 5-0356.
LOS ANGELES 11, CALIF.: Montgomery Brothers, 2113 So. San Pedro St., RIchmond 7-9401.
OMAHA 2, NEB.: Midwest Equipment Co. of Omaha, 1614 Izard St., ATlantic 7600-7601.
PORTLAND 9, ORE.: Montgomery Brothers, 1632 N.W. Johnson St., CApitol 3-4197.
SAN FRANCISCO 3, CALIF.: Montgomery Brothers, 1122 Howard St., UNderhill 1-3527.
SEATTLE 4, WASH.: Montgomery Brothers, 911 Western Ave., SEneca 3270.
WICHITA 2, KANS.: Fraser D. Moore Co., 352 No. Broadway, AMherst 2-5647.

coming events

. . . for industry power

Mar. 10-16	Nuclear Congress and Atomic Exposition	Convention Hall, Philadelphia
Mar. 11-15	NACE Annual Convention	Kiel Auditorium, St. Louis
Mar. 18-21	ASME Gas Turbine Power Conference	Sheraton-Cadillac Hotel, Detroit
Mar. 27-28	ASME Engineering Management Conference	Pittsburgh
Mar. 27-29	American Power Conference	Hotel Sherman, Chicago
Apr. 8-10	ASME Spring Meeting	Dinkler-Tutwiler Hotel, Birmingham, Ala.
Apr. 9-11	American Welding Society Fifth Welding Show	Convention Hall, Philadelphia
Apr. 14-17	Building Research Institute Annual Meeting	Drake Hotel, Chicago
Apr. 14-24	First U. S. World Trade Fair	Coliseum, New York City
Apr. 15-17	ASLE Meeting	Sheraton-Cadillac Hotel, Detroit
Apr. 22-24	ASME Instruments and Regulators Conference	Evanston, Ill.

Industry Power

A PUTMAN-STYLE magazine

features all these unique elements

- TERSE, VITAL EDITORIAL
- HAND-PICKED CIRCULATION
- SQUARE HIGH-VISIBILITY FORMAT
- QUALITY READERSHIP
- MORE READER ACTION

published by

PUTMAN PUBLISHING CO.

also publishers of
FOOD PROCESSING, CHEMICAL PROCESSING
FOOD BUSINESS

Precious Jewel of Industry's Future

"Black Diamonds" are America's most valuable resource for today and tomorrow! Only Bituminous coal can fully meet industry's needs for more electrical energy and more plant-power.

Convenient reserves of B&O Bituminous offer an unlimited supply of coals for every purpose, at low-cost. *Ask our man!*

LET OUR COAL TRAFFIC REPRESENTATIVES suggest a B&O Bituminous for your needs.

COAL TRAFFIC DEPARTMENT B&O RAILROAD
Baltimore 1, Md. LExington 9-0400

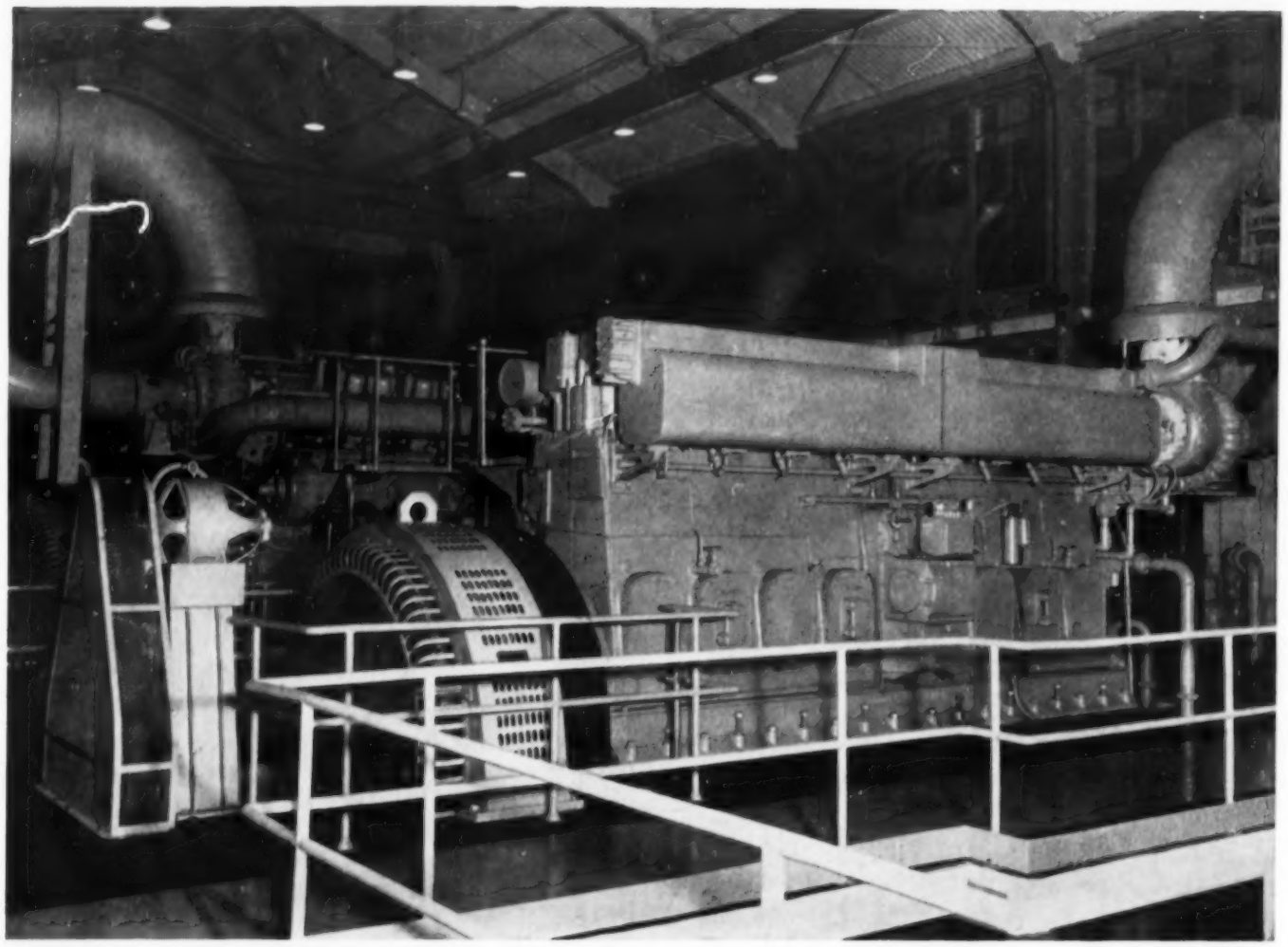
BALTIMORE & OHIO RAILROAD

Bituminous Coals For Every Purpose

LINKING 13 GREAT STATES WITH THE NATION B&O

Circle 139 on READ-N-CIRCLE card for more data

POWER PLANT OPERATORS REPORT:



MORE POWER

FROM TEXACO-LUBRICATED ENGINES

According to actual case history reports, power plant engines show a power performance improvement when lubricated with *Texaco Ursa Oils*. This is because *Texaco Ursa Oils* 1) help keep rings free for full-power compression and complete combustion, 2) resist oxidation and sludging, 3) prevent harmful deposits, 4) reduce wear.

There is a complete line of *Texaco Ursa Oils*, designed and processed especially to make diesel, gas, and dual-fuel engines deliver *more power* with *less fuel* and *longer periods* between overhauls.

For over 20 years, more stationary diesel horsepower in the U. S. has been lubricated with Texaco than with any other brand.

Your Texaco Lubrication Engineer will give you full information. Just call the nearest of more than 2,000 Texaco Distributing Plants in the 48 States or write:

☆ ☆ ☆

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO **TEXACO URSA OILS**
FOR ALL DIESEL, GAS AND DUAL-FUEL ENGINES

TUNE IN . . . METROPOLITAN OPERA RADIO BROADCASTS EVERY SATURDAY AFTERNOON

Circle 105 on READ-N-CIRCLE card for more data

Industry Power

Putman Publishing Company
CREATORS OF
Putman–Style
MAGAZINES
. . . featuring all these essential elements:

- **TERSE** VITAL EDITORIAL
- **HAND-PICKED** CIRCULATION
- **SQUARE FORMAT**
- **HIGH VISIBILITY**
- **QUALITY READERSHIP**
- **MORE READER ACTION**